Operation Guide

for Calcu]Fin

Version 1.1

Calcu]Soft

Notice

This manual and the examples contained herein are provided "as is" as a supplement to CalcuFin application software available from Texas Instruments for TI-89 platform.

Acknowledgements
The CalcuFin software and opreation guide were developed by Ju-Chang Oh with the generous support of TI's development team.

CalcuFin Informations
Release Date : 14. April, 2003.
Version Number : 1.1

Company Informations
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Introduction to CalcuFin

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Introducing CalcuFin

The major characteristics of *CalcuFin* are as follows.

User Friendly Interface

Unlike other financial programs, *CalcuFin* is designed to interact with users through an easy-to-follow step-by-step 'question & answer' interface.

Ease of Use

Displaying key explanations of all variables and equations in every input & output stage, *CalcuFin* allows users to concentrate on the calculation instead of memorizing its functions or referring to thick manuals.

Enhanced Efficiency

Integration of the program, solver (Numerical Solver) and spread sheet(Data/Matrix Editor) modes enables users to comprehensively analyze and acquire necessary solutions to various topics quickly. With its innovative integration, *CalcuFin* has infinite expandability.

Step-by-step Learning-by-doing

This well-organized financial program leads users to learn and understand the financial and accounting theories more readily by following each step of *CalcuFin.*

NOTE : *CalcuFin was developed using the NPV and IRR of "Finance for TI-89" functions. Therefore, in order to use CalcuFin, "Finance for TI-89" freeware application must be installed before running program.*

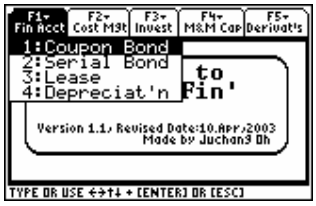
Structure of CalcuFin

CalcuFin consists of 5 categories (folder type): financial accounting, cost management, Investment, M&M Capital structure, and Derivatives. Each of categories is made up 4～6 sub-menus.

Each sub-menus in CalcuFin's each category is displayed by pressing **ƒ** to **‡**.

Financial Accounting (ƒ)

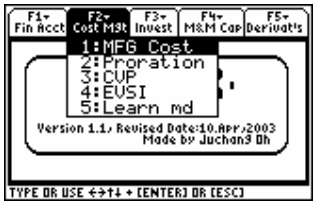
Financial Accounting folder has 4 sub-menus. To see the sub-menus of Financial accounting, press **ƒ**.



1.1. Coupon Bond : Analysis of Coupon Bond.
1.2. Serial Bond : Analysis of Serial Bond
1.3. Lease : Analysis of Lease.
1.4. Depreciat'n : Depreciation Method.

Cost Management („)

Financial Management folder has 5 sub-menus. To see the sub-menus of Financial management, press **„**.

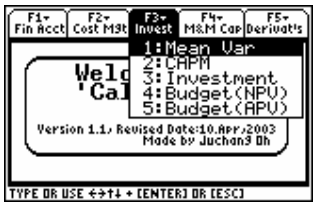


2.1. MFG Cost : Analysis of Manufacturing Cost (FIFO, AVE)

2.2. Proration : Analysis of Cost Variance Proration
2.3. CVP : Analysis of Cost-Volume-Profit (CVP)
2.4. EVSI : Expected Value of Sample Information
2.5. Learn md : Learning Model (Cumulative Average-Time, Incremental Unit-Time)

Investment (…)

Investment folder has 5 sub-menus. To see the sub-menus of Investment, press **…**.



3.1. Mean-Var : Analysis of Mean Variance
3.2. CAPM : Analysis of CAPM
3.3. Investment : Analysis of Investment Decision (NPV, MIRR, ARR, AEV, PI, WAPI)
3.4. Budget(NPV) : Cash Flows and Capital Budget
3.5. Budget(APV) : Analysis of Adjusted Present Value(APV)

M&M Capital Structure (†)

M&M(Modigliani and Miller) Capital Structure folder has 4 sub-menus. To see the sub-menus of M&M Capital Structure, press **†**.

4.1. Leverage : Analysis of Leverage
4.3. M&M Cap : Analysis of Capital structure by M&M
4.4. Miller Cap : Analysis of Capital structure by Miller
4.5. Hamada Cap : Analysis of Capital structure by Hamada

Derivatives and Other topics (‡)

Derivatives folder has 5 sub-menus. To see the sub-menus of Derivatives, press ‡ .

5.1. Binom OPM : Option Price Model by Binomial Distribution

5.2. B&S OPM : Option Price Model by Black & Sholes

5.3. Duration : Analysis of Duration and Convexity

5.4. Future Gain : Analysis of Hedge Gain in Future

5.5. Hedge Ratio : Analysis of Hedge Ratio in Future

5.6. Exchange : Analysis of Foreign Exchange

Summary of CalcuFin

The following is a brief summary of *CalcuFin* and describes what *CalcuFin* can solve in each sub-menu.

Financial Accounting (*f*)

You can select “Financial Accounting” menu, pressing ***f*** key in application initial screen.

1. Coupon Bond

COUPON BOND menu is used to analyze the term bond with coupon that matures at the specified time. Once you've entered the bond data, you can:

- Calculate the market value and effective interest rate for bonds issued at a discount or a premium.
- Draw up the amortization table which amortizes a bond discount (premium) over the life of bond and calculate the bond carrying amount and interest expense by the effective interest method of amortization.

2. Serial Bond

SERIAL BOND menu is used to analyze the serial bond with coupon that mature in installments over a period of time and the capital leases. Once you've entered their data, you can:

- Calculate the market value or the effective interest rate for the bond issued at a discount or a premium.
- Draw up the amortization table which amortizes a bond discount(premium) over the life of bond and calculate the bond carrying amount and interest expense by the effective interest method of amortization.

3. Lease

LEASE menu is used to analyze the capital leases. Once you've entered their data, you can:

- Calculate the market value and effective interest rate of lease.
- Draw up the schedule of lease amortization over the life of lease and calculate the lease carrying amount and interest expense by the effective interest method of amortization.

4. Depreciat'n

DEPRECIAT'N menu is used to analyze various depreciation methods: Straight line, Sum of the years' digits, Units of production, Fixed rate, Double declining balance, 150% declining balance.

- Calculate the depreciation expense and accumulated depreciation each period.
- Calculate the asset book value at the end of each period.

Summary of CalcuFin

Cost Management
(„)

You can select “Cost Management” menu, pressing „ key in application initial screen.

1. MFG Cost

MFG COST menu is used to analyze production costs including the spoilage cost in the process-costing system under both weighted average method (AVE) and first-in and first-out method (FIFO).

- Calculate the cost per equivalent unit.
- Calculate the first assigned costs of good units completed and transferred out, normal spoilage, abnormal spoilage and ending work in process.
- Calculate the second assigned costs of good units completed and transferred out and ending work in process, which the normal spoilage and abnormal spoilage costs are assigned to.
- Draw up the statement of production cost including the spoilage cost.

2. Proration

PRORATION menu is used to analyze the proration of manufacturing variances in a standard costing system. Once you've entered the basic data of the proration of variances, you can:

- Calculate the proration rate of each manufacturing variance.
- Calculate the proration amount of each manufacturing variance.
- Draw up a schedule table that prorates the manufacturing variances.

3. CVP

CVP menu is used to analyze the Cost Volume and Profit (CVP). Once you've entered the basic data of CVP, you can:

- Calculate the variables of CVP analysis for the units of sale.
- Calculate the variables of CVP analysis for the amount of sale.
- Calculate the variables of the CVP analysis for the cash flows.

4. EVSI

EVSI menu is used to analyze the valuation of imperfect information(or sample information) by Bayesian rule. It calculates the expected value of sample information that help choose the action with higher payoff. Once you've entered the given prior data for each state, you can:

- Calculate the posterior probabilities by Bayesian rule.
- Calculate the maximum payoff under sample information.
- Calculate the maximum payoff under no sample information.
- Calculate the expected value of sample information (EVSI)

5. Learn md

LEARN MD menu is used to analyze the nonlinear cost function of two learning model; the cumulative average-time and incremental unit-time. Once you've entered the basic data of learning model, you can:

- Calculate the cumulative average time per unit for each unit.
- Calculate the incremental unit time for each unit.
- Calculate the cumulative total time for each unit.

Summary of CalcuFin

Investment (...)

You can select “Investment” menu, pressing **...** key in application initial screen.

1. Mean-Var

MEAN-VAR menu is used to analyze risk and return on the mean-variance uncertainty. It can do statistical calculations of observations of returns and also compute risk and return for each asset and a two-asset portfolio

- Calculate the mean, variance, standard deviation, covariance, and correlation.
- Calculate the variance, standard deviation, covariance, and correlation under the Sharpe model.
- Calculate the beta(regression coefficient of market portfolio).
- Calculate the weights of the minimum variance portfolio.
- Calculate the systematic risk and unsystematic risk of each asset or a two-asset portfolio.

2 CAPM

CAPM menu is used to analyze risk and return on the CAPM model. It can do statistical calculations of observations of returns for market portfolio and an asset and also compute risk and return for the asset. Once the observations of return rates on each asset or market portfolio have been entered, you can:

- Calculate the mean, variance, standard deviation, covariance, and correlation.
- Calculate the beta(regression coefficient of market portfolio) and required rate of return.
- Calculate the capital market line(CML), security market line(SML), and regression line.

3. Investment

INVESTMENT menu is used to analyze cash flows (money received or money paid out) of uneven amounts for investment decision. There are five widely used capital budgeting techniques in this menu. You can:

- Calculate the net present value (NPV).
- Calculate the internal rate of return (IRR).
- Calculate the accounting rate of return (ARR).
- Calculate the annual equivalent value (AEV).
- Calculate the profitability index (PI) and the weighted average profitability index(WAPI).

4. Budget (NPV)

BUDGET(NPV) menu is used to analyze the net present value of the cash flows of firm's operation for capital budgeting purposes.

5. Budget (APV)

BUDGET(APV) menu is used to analyze the Adjusted Present Value (APV) for capital budgeting purposes. Once you've entered the basic data of APV, you can:

- Calculate the NPV of the project to an unlevered firm (Base case NPV).
- Calculate the NPV of financing side effects (NPVF);
  Tax subsidy to debt, Costs of issuing new securities, and Subsidies to debt financing.

Summary of CalcuFin

M&M Capital Structure (†)

You can select "M&M(Modigliani and Miller) Capital Structure" menu, pressing † key in application initial screen.

1. Leverage

LEVERAGE menu is used to analyze business and financial risk; It can display and calculate followings through Numeric Solver mode.

- Calculate EBIT(Earnings before interest and taxes), EPS(Earnings per share), PER (Price/earnings ratio).
- Calculate Financial Breakeven Point.
- Calculate DOL(Degree of Operating Leverage), DFL(Degree of Financial Leverage), DCL(Degree of Conbining Leverage).

2. M&M Cap

M&M CAP menu is used to analyze Modigliani & Miller proposition.

- Display the variables and formula using M&M proposition.
- Calculate the cost of debt using the CAPM.
- Calculate the cost of equity using the M&M Proposition II.
- Calculate the weighted average cost of capital using the M&M Proposition III.
- Calculate the value of levered firm using the M&M Proposition I.
- Calculate the equity value of levered firm using the net income and cost of equity.
- Calculate the weighted average cost of capital using each cost.

3. Miller Cap

MILLER CAP menu is used to analyze the capital structure under personal and corporate taxes.

- Display the variables and formula using M&M proposition.
- Calculate the cost of equity under personal and corporate taxes.
- Calculate the weighted average cost of capital under personal and corporate taxes.
- Calculate the value of unlevered firm under personal and corporate taxes.
- Calculate the value of levered firm under personal and corporate taxes.
- Calculate the equity value of levered firm under personal and corporate taxes.

4. Hamada Cap

Hamada Cap menu is used to analyze Hamada model.

- Calculate the beta of equity (B_{SL}, B_{SU}) using the Hamada model.
- Calculate the capital cost of unlevered firm using the Hamada model and B_{SU}.
- Calculate the beta of asset (B_A) using the Hamada model and B_S, B_B.
- Calculate the capital cost of unlevered firm using the CAPM model and B_{SU}.
- Calculate the weighted average cost of capital using the CAPM model, the Hamada model and B_{SU}, B_B.
- Calculate the weighted average cost of capital using the CAPM model, the Hamada model and B_S, B_B.

Summary of CalcuFin

Derivatives and Other topics (‡)

You can select “Derivatives and Other topics” menu, pressing ‡ key in application initial screen.

1. Binom OPM

BINOM OPM menu is used to analyze the call and put option using the binomial model for pricing option on stocks. Once you've entered the option terms and the data required by the binomial model, you can:

- Calculate the hedge ratio.
- Calculate the hedge probability.
- Calculate the option equilibrium price

2. B&S OPM

B&S OPM menu is used to analyze the call and put option using the Black-Sholes model and the put-call parity for pricing option on stocks.

- Calculate the parameters (d1, d2) on the Black-Sholes model.
- Calculate the accumulative normal distributions of (d1, d2) on the Black-Sholes model.
- Calculate the option equilibrium price.
- Calculate the hedge ratio.

3. Duration

DURATION menu is used to analyze the duration of a bond. Once you've entered the bond data, you can:

- Calculate the duration of term bonds and calculate the bond convexity.
- Calculate the elasticity of bond price for interest rate using the duration.
- Calculate the change of bond price for interest rate using the duration.
- Calculate the change of bond price for interest rate using the convexity.

Summary of CalcuFin

4. Future Gain

FUTURE GAIN menu is used to analyze the hedge future transaction in the commodity futures, stock index futures and interest rate futures

- Calculate the hedge ratio and number of hedge contracts for commodity futures, stock index futures, interest rate futures.
- Calculate the transaction gain or loss by a hedge future transaction.
- Calculate the net profit and net price by a hedge future transaction.

5. Hedge Ratio

HEDGE RATIO menu is used to analyze the commodity futures, stock index futures and interest rate futures.

- Calculate the hedge ratio and number of hedge contracts for commodity futures, stock index futures, interest rate futures.
- Calculate the number of contracts to set the target beta of portfolio for stock index futures.
- Calculate the number of contracts to set the target duration of portfolio for interest rate futures.

6. Exchange

EXCHANGE menu is used to analyze the relationship between the spot exchange rate, futures exchange rate, inflation rate and interest rate.

- Calculate the exchange rate and inflation rate by the purchasing power parity.
- Calculate the exchange rate and interest rate by the interest rate parity.
- Calculate the exchange rate and interest rate by the forward parity.

Operation of CalcuFin

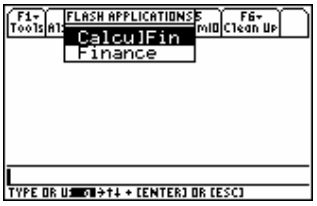
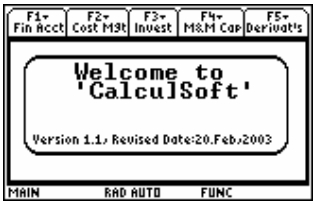
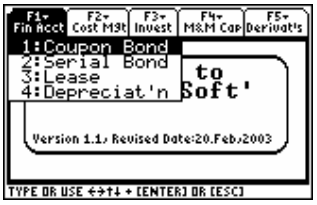
2

Starting and Exiting CalcuFin

This section shows how to start *CalcuFin*, select a sub-menu and exit to the home screen.

To start CalcuFin

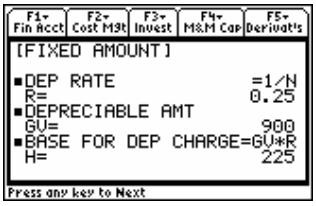
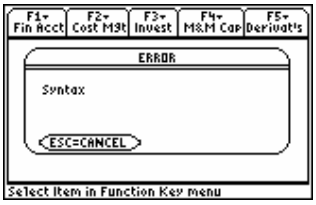
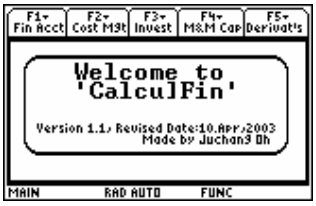
Perform following steps to start *CalcuFin* .

Steps	Display
1. Press **O** and ¸ to display the list of installed Apps on your calculator.	
2. Select "Calcu]Fin" using arrow key (**C D**) and press ¸ to start *CalcuFin*.	
NOTE : CalcuFin was developed using the NPV and IRR of "Finance for TI-89" functions. Therefore, in order to use CalcuFin, "Finance for TI-89" freeware application must be installed before running program.	
3. The initial screen of *CalcuFin* is displayed.(In the initial screen of *CalcuFin*, you can exit to home screen by pressing " .)	
4. Press ƒ ,.. ‡ to display the sub-menus of each categories. Select a sub-menu program using arrow key (**C D**) and press ¸ to start it. You can also start a sub-menu by pressing function key (ƒ ,.. ‡) and number key(¨ , © ..).	

Starting and Exiting CalcuFin

To exit CalcuFin

While running on a sub-menu program, if user wants to break and exit, perform following steps.
To exit *CalcuFin*, you must be on the initial screen of *CalcuFin*.

Steps	Display
1. A sub-menu program is running.	
2. Press **N** to break the program, then it will be displayed "error pop-up window of Syntax".	
3. Press **N** again to close "error pop-up window" then it will be changed to initial screen of *CalcuFin*. On initial screen of *CalcuFin,* press **"** key to exit *CalcuFin* to home screen	

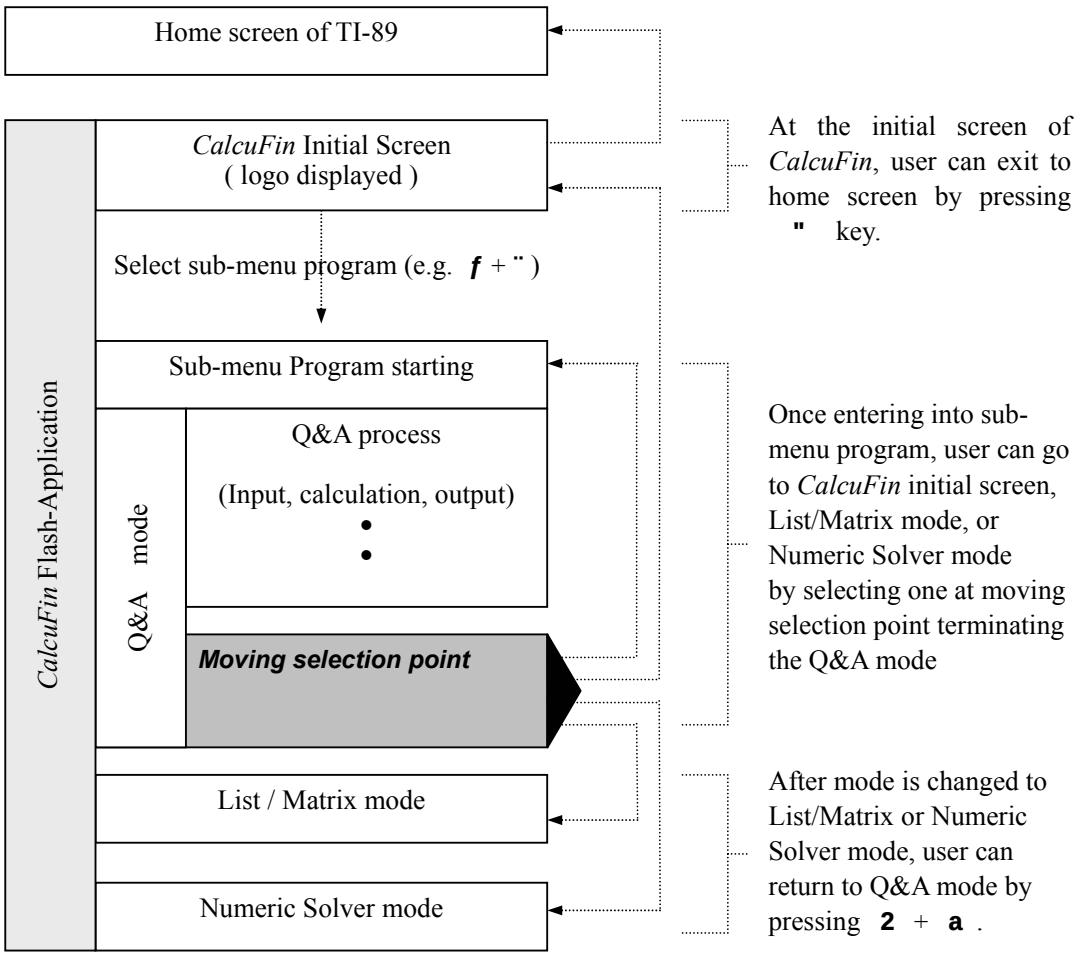
NOTE : While running on sub-menu-program, some function keys are not operated.(**"** , **´** , **3** , **O** , **½** , **2** +.. , **¥** +.. etc.) When running on *CalcuFin*, they can be operated only on the initial screen of *CalcuFin*.
If you want to operate functions of unavailable keys on *CalcuFin*, first you must go to the initial screen pressing **N** + **N** .

Navigating within CalcuFin

This section describes structure and relationship between Q&A mode, List/Matrix mode and Numerical Solver mode of *CalcuFin*.

Structure of CalcuFin

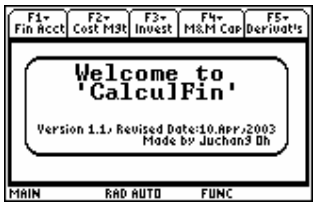
CalcuFin has sub-menu programs. Each sub-menu program is composed of Q&A mode, List/Matrix mode and Numeric Solver mode.



Navigating within CalcuFin

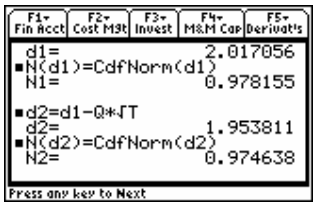
Initial Screen of CalcuFin

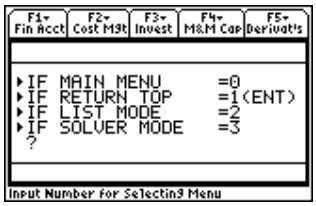
Following figure is initial screen of *CalcuFin.* User can select sub-menu programs using function keys, and also exit to home screen by pressing **"** key.

Description	Display
ƒ ~ **‡** : display sub programs of each category. **"** : exit to home screen.	

Q&A mode

Each Q&A mode consists of 3 parts; topic selection, input & output, and moving selection.

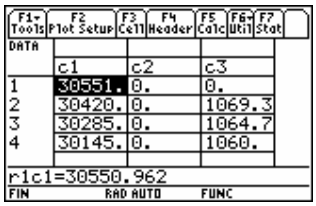
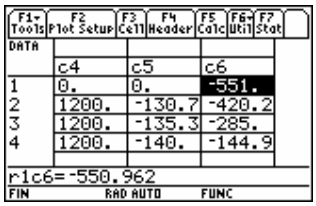
Description	Display
1. Topic Selection Step Most of sub-menu programs have topic selection menus at the first step. You can select your topic at this step.	
2. Input and Output Step You may input values and acquire answers according to displaying key explanations of all variables and equations in every input & output stage	 

Description	Display
3. Moving Selection Step At the end of the sub-menu program, you can select moving.	

If you enter 0 (Main Menu), it moves to initial screen of *CalcuFin*. If you enter 1 (Return Top), it moves to the first step of Q&A mode. If you enter 2 or 3, it moves to list/matrix or solver mode.

List / Matrix mode

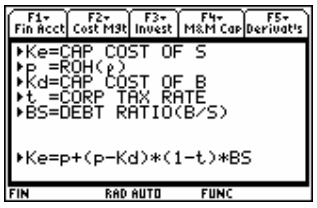
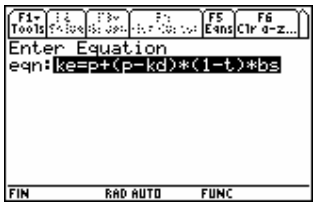
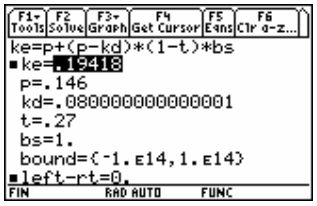
Each List/Matrix mode consists of 2 parts; Column explanation and View and editor.

Description	Display
1. Column explanation This displays the meaning of each column of the list or matrix.	
2. View and Editor You may view, edit or calculate cell values.	 

Navigating within CalcuFin

Numeric Solver mode

Each Numeric Solver mode consists of 3 parts; Variable explanation, Editing Equation and Solving for variable.

Description	Display
1. Variable explanation This displays the meaning of each variable of the equation.	
2. Editing Equation You may view or modify the equation.	
3. Solving for variable You assign values to known variables and then compute the values for unknown variables. By changing the values of the variables, you can quickly ask "what if" questions and compare results.	

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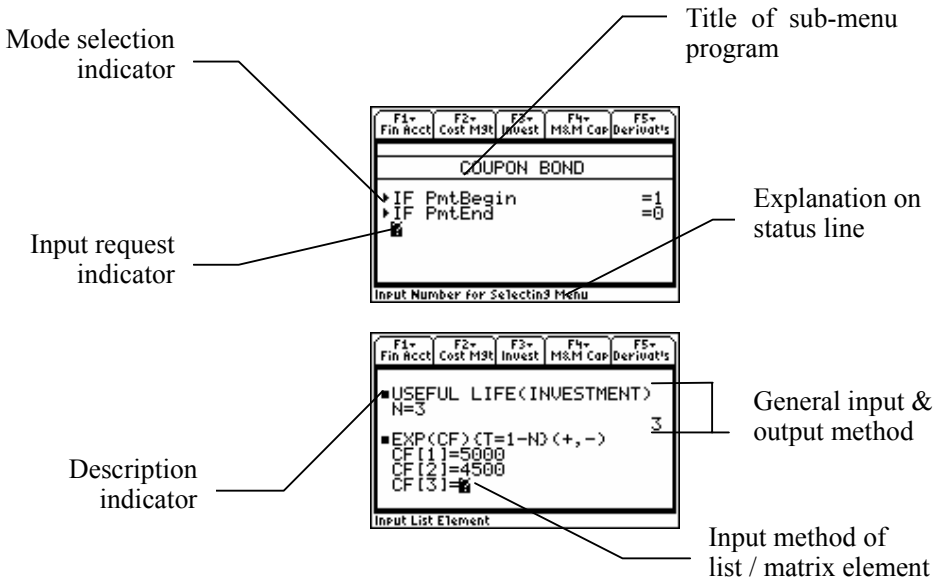
Explanation of indicators

This section describes appearance of the *CalcuFin*.

Appearance of CalcuFin

Once entering into sub-menu of *CalcuFin*, you can see the appearance as follows. The following explains how the screen of *CalcuFin* is constructed.



Indicator

Sign	Meaning
ú	Note indicator except general input & output (Mode selection, Reference, etc.)
■	Input or output description indicator
?	Input request

Keystroke of CalcuFin

This section explains basic operation of keystroke while running on program.

Overview of important keys

Most of keys are basically same as TI-89 calculator. Refer to TI-89 Guide book.
Some function keys (**"** , ´ , **3** , **O** , **½** , **2** +.. , **¥** +.. etc.) can be operated only on the initial screen of *CalcuFin*.

Key	Description
0	Deletes the character to the left of the cursor
M	Erases the entry line
N	Breaks and exits from the program running
¸	Inputs value of variables, executes an instruction. go to next step, etc.
A,**B**,**C**,**D**	Move the cursor in a particular direction

Note on key operation

The arithmetical operations (**«** , **|** , **p** , **e** , **Z** , etc.), as well as entering numeric and alphabetic characters, are same as basic operation of TI-89 calculator.

Up and down cursors (**C D**) are not available while inputting data on the program running.

Root key (**]**) is not available on the program running (In case user needs to input **]** key, use " ^2" instead of **]** key.)

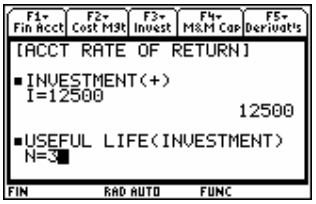
Don't turn off the power of calculator using ´ key while running on program. You can turn off the power after go to initial screen of *CalcuFin* .

Variable Management

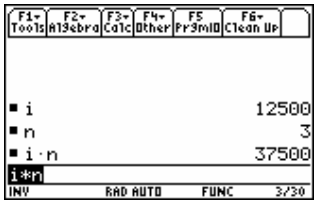
All values of variables that are entered and computed are stored and retained in 'FIN' folder.

Maintenance of Variables

Last entered and computed values in the *CalcuFin* variables are retained in FIN folder even when you turn off TI-89. If RAM is cleared, the variables are deleted.



[Figure1] *CalcuFin*

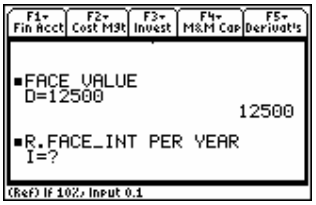


[Figure2] Home screen

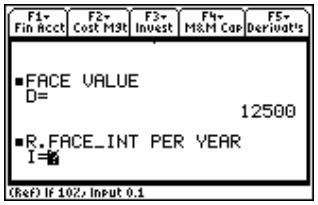
The variables of *CalcuFin* (for example I, N of [figure1]) are stored in FIN folder. You can use the name in stead of the value in expression in the home screen such as [Figure2] when the current folder is FIN.

Inputting a Previous Value

In input process of *CalcuFin*, you can use the variable's previous value only by pressing , without inputting a value and also type the variable name into the expression, using **j** as necessary.



[Figure3] First running



[Figure4] Second running

If you input a value of D (12500+ ,) in first running such as [figure3], and then the entered value of D is not changed in second running, you can recall the last entered value by pressing , key such as [figure4].

Examples of Financial Accounting

3

Example 1.1 : Coupon

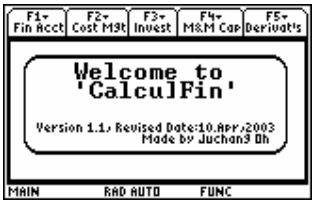
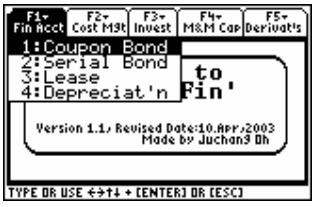
COUPON menu is used to analyze the term bond with coupon that matures at the specified time. Once you've entered the bond data, you can:

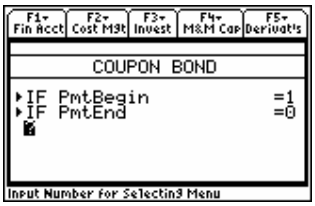
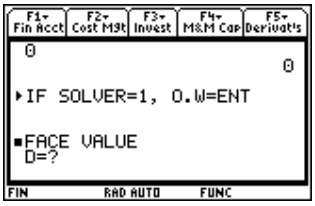
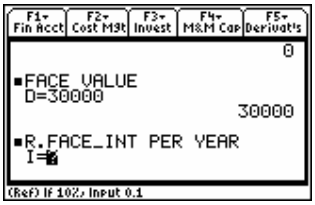
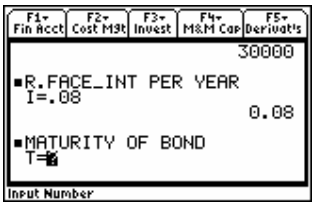
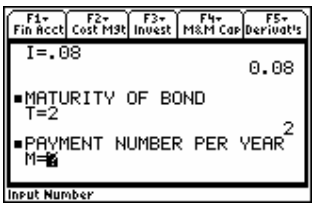
- Calculate the market value and effective interest rate for bonds issued at a discount or a premium.
- Draw up the amortization table which amortizes a bond discount(premium) over the life of bond and calculates the bond carrying amount and interest expense by the effective interest method of amortization.

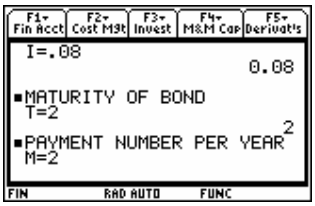
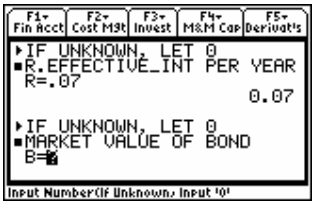
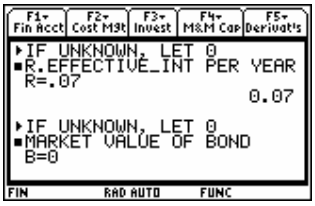
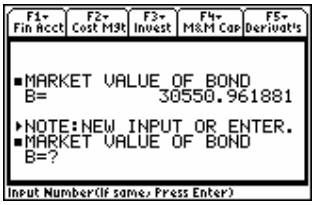
Example: Price ,Yield and Amortization of a Term Bond

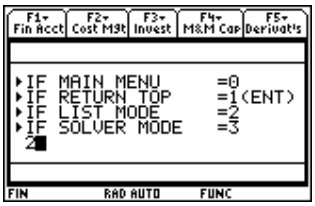
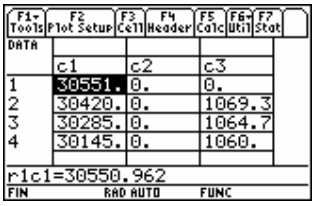
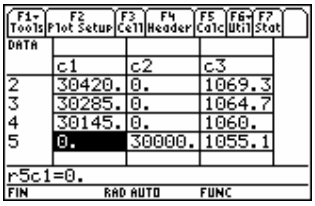
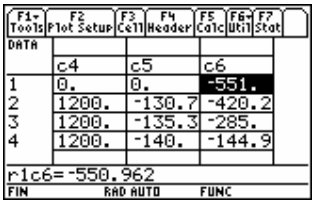
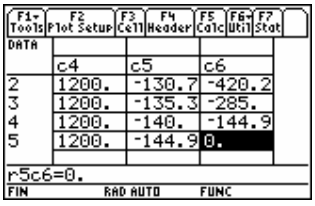
On September 30, 2001, you issue $30,000 of 8%, 2-year bonds payable. The bonds pay interest on March 31 and September 30. You will amortize bond premium and discount by the effective-interest method.

[Part 1] : What price should you issue the bond at if the market interest rate is 7% on September 30, 2001? Calculate and print an amortization table for the bond.

Step	Keystroke	Display
Initial screen of application. (**O** Select “FlashApps” + ¸ Select “CalcuFin” + ¸)		
Select “Fin Acct”(Financial Accounting) category and “Coupon” menu.	*f* ¸	

Step	Keystroke	Display
Set payment due. Input '0' if "Payment End".	μ ,	
If select solver mode, input '1'. otherwise, press , .	,	
Display of input request of face value.		
Input face value of bond.	30000 ,	
Input face interest rate.	0.08 ,	
Input maturity of bond.	2 ,	

Step	Keystroke	Display
Input number of payments per year.	2 ¸	
Input effective interest rate per year.	0.07 ¸	
In this case, select calculation of market value.	0 ¸	
Display of calculated market value.(30550.96) Press ¸ if it is not necessary to input new value. (It is possible to input new value if needed.) Modification of calculated market value is not necessary for this example.		

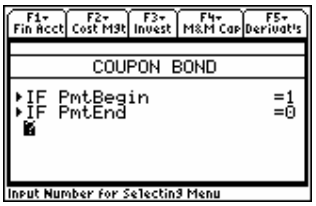
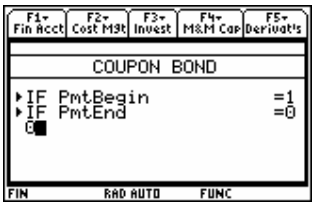
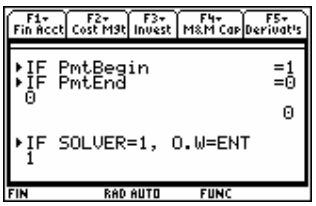
Step	Keystroke	Display
Select list mode to display amortization table.	2	
Display of explanation for columns of amortization table.		
Display of amortization table as list type. c1: Bond carrying amount c2: Principal paid c3: Interest expense(revenue) c4: Face interest paid c5: Discount(Premium) amortized c6: Discount(Premium) balance		   

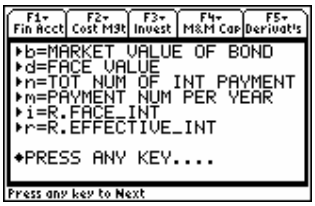
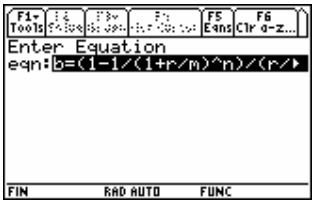
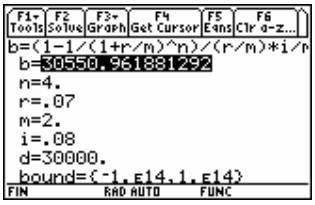
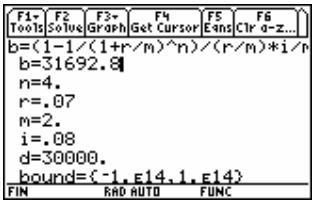
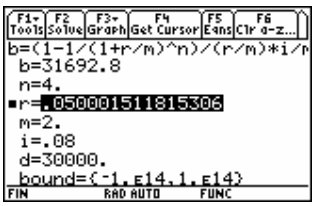
Part 2 shows connection between Part 1 application and solver. You can use the entered and computed variables of Part 1.

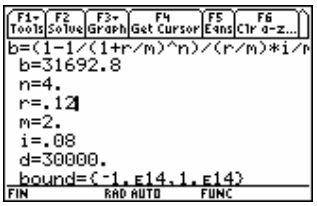
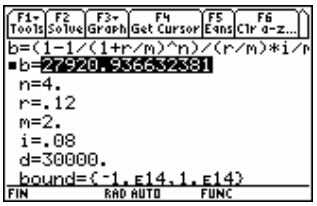
[Part 2] :

a) What is the effective interest rate on September 30, 2001 if you can issue the bonds at $31,692.8 ?

b) What price should you issue the bond at if the market interest rate is 12% on September 30, 2001? Calculate and print an amortization table for the bond.

Step	Keystroke	Display
Press **2** + **a** to change list mode to Q&A mode.		
Set payment due. Input '0' if "Payment End".	0 ,	
If select solver mode, input '1'. otherwise, press , .	1 ,	

Step	Keystroke	Display
Display of meaning of variables in solver mode. d : Face Value i : Face Interest Rate n : Total Number of Payment m : Payment Number per Year r : Effective Interest Rate b : Market Value of Bond		
Display of current equation.	,	
Display of values entered and computed as below variables in Part1. b : Market Value of Bond n : Total Number of Payment m : Payment Number per Year r : Effective Interest Rate i : Face Interest Rate d : Face Value		
a) Input new market value of bond. Place cursor on ‘b’ prompt and input. Place cursor on ‘r’ prompt. Press „ to solve effective interest rate ‘r’.	31692.8 , „	 

Step	Keystroke	Display
b)		
Input new effective interest rate.	0.12	
Place cursor on ‘r’ prompt and input.	¸	
Place cursor on ‘b’ prompt.	„	
Press „ to solve market value ‘b’.		

Example 1.2 : Serial Bond

SERIAL BOND menu is used to analyze the serial bond with coupon that matures in installments over a period of time. Once you've entered their data, you can:

- Calculate the market value or the effective interest rate for the bond issued at a discount or a premium.
- Draw up the amortization table which amortizes a bond discount (premium) over the life of bond and calculate the bond carrying amount and interest expense by the effective interest method of amortization.

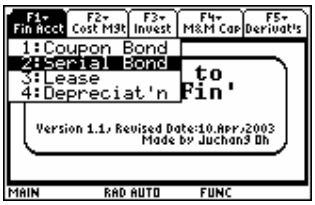
Example: Price ,Yield and Amortization of a Serial Bond

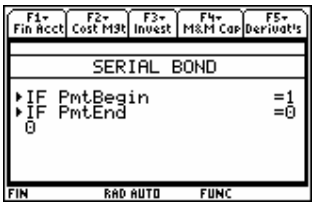
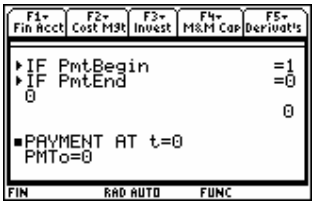
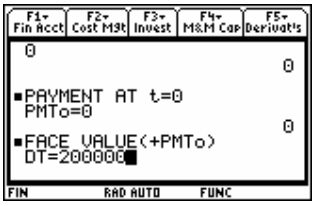
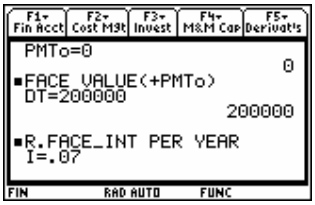
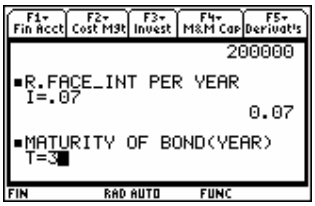
On January 1, 2001, you issued a 7% three-year note payable that called for annual installment payments of the following principal plus interest.

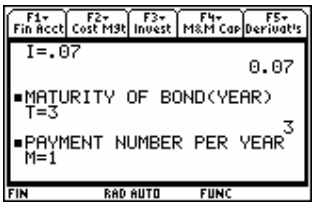
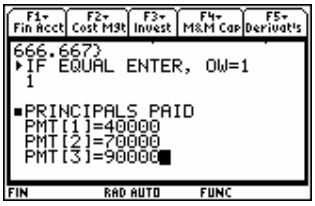
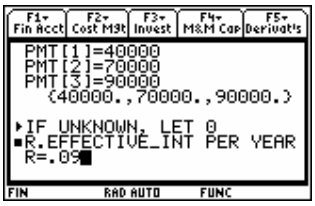
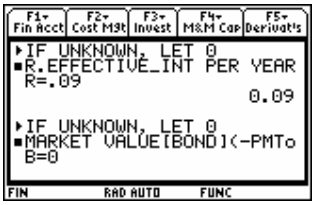
Year	Installment Payment
2001	$ 40,000
2002	$ 70,000
2003	$ 90,000
Total	$200,000

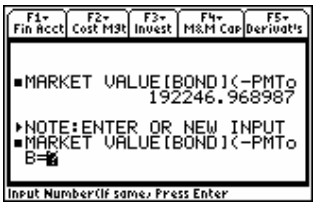
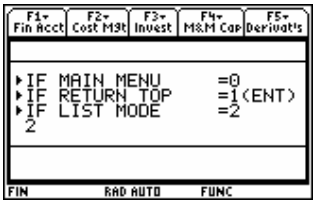
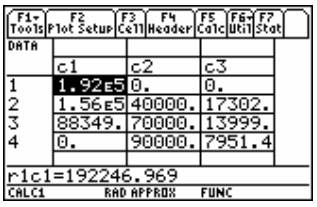
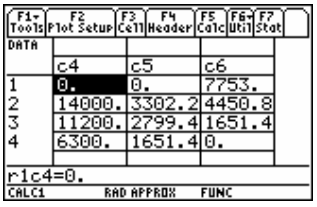
The note pays annual installment payment and interest on December 31. You will amortize premium and discount by the effective interest method.

What price should you issue the note at if the market interest rate is 9% on January 1, 2001? Calculate and print an effective interest method amortization table for the note.

Step	Keystroke	Display
Select “Fin Acct”(Financial Accounting) category and “Serial Bond” menu.	*f* a	

Step	Keystroke	Display
Set payment due. Input '0' if Payment End.	0 ·	
Input '0' if initial payment of principal is 0.	0 ·	
Input total face value.	200000 ·	
Input face interest rate.	0.07 ·	
Input maturity of bond by the year.	3 ·	

Step	Keystroke	Display
Input number of payments per year.	1 ,	
Display of principals to be paid each period as list type when equal. If not equal, input '1'. (1 + ,)	1 ,	
Input principals to be paid each period as list element type.	40000 , 70000 , 90000 ,	
Input effective interest rate. (0.09 + ,)	0.09 ,	
Input market value if you know. In this case, you want to acquire market value.	0 ,	

Step	Keystroke	Display
Display of calculated market value.(192246.97) Press , if it is not necessary to input new value. (It is possible to input new value if needed.) Modification of calculated market value is not necessary for this example.	,	
Select list mode.	2 ,	
Display of meaning of columns of amortization table.		
Display of amortization table as list type. c1: Bond carrying amount c2: Principal paid c3: Interest expense(revenue) c4: Face interest paid c5: Discount(Premium) amortized c6: Discount(Premium) balance		 

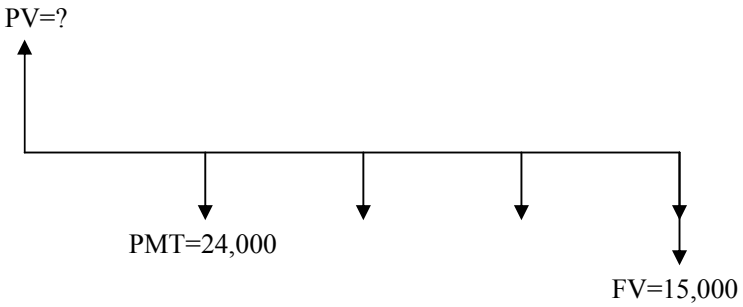
Example 1.3 : Lease

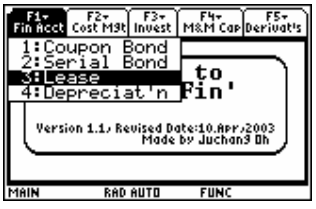
LEASE menu is used to analyze the capital leases. Once you've entered their data, you can:

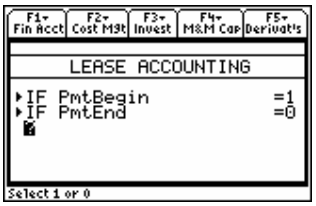
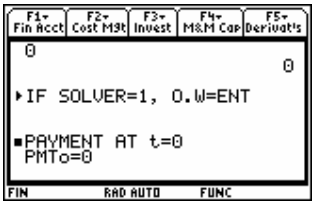
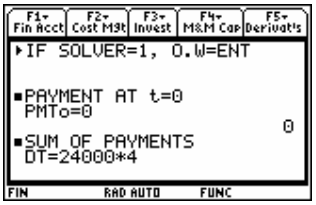
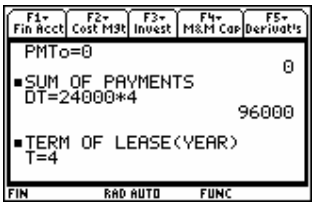
- Calculate the market value and effective interest rate of lease.
- Draw up the schedule of lease amortization over the life of lease and calculate the lease carrying amount and interest expense by the effective interest method of amortization.

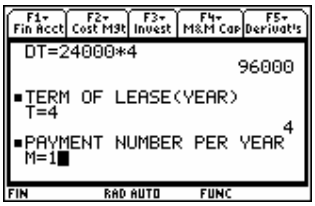
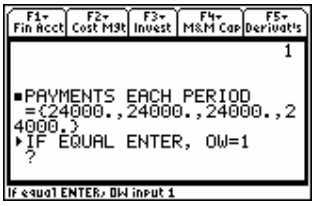
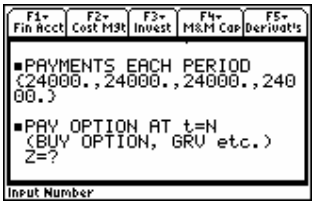
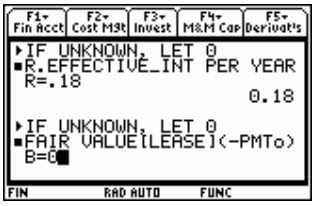
Example: Present Value of a Lease and Amortization of a Lease

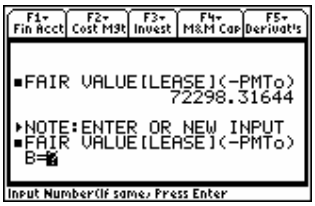
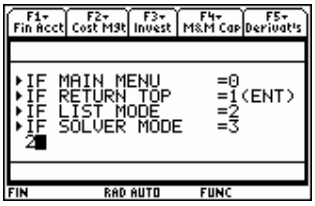
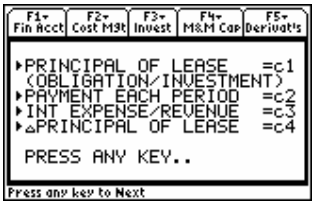
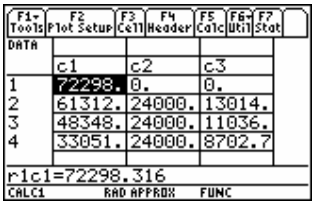
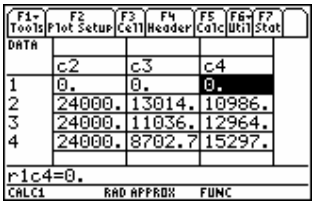
You are leasing a machine for 4 years. Annual payments are $24,000. The leasing agreement includes an option to buy the machine for $15,000 at the end of the leasing period. What is the market value of the lease, assuming that the effective interest rate of the lease is 18%, compounded yearly?



Step	Keystroke	Display
Input '0' as initial lease payment(w) is 0.	0	

Step	Keystroke	Display
Set payment due. Input '0' if "Payment End".	0 ,	
If select solver mode, input '1'. otherwise, press , .	,	
Input '0' if there is no initial payment.	0 ,	
Input the sum of lease payments.	24000*4 ,	
Input lease term by the year.	4 ,	

Step	Keystroke	Display
Input number of payments per year.	1 ,	
Display of lease payments each period as list type when equal. If equal, press , .	,	
Display of lease payments each period as list type. Input payment option at end of leasing period. (Bargain purchase option, Guaranteed Residual Value(GRV), Residual Value, etc.)	15000 ,	
Input effective interest rate.	0.18 ,	
In this case, you want to solve fair value of lease. (It is possible to input fair value of lease if you know.)	0 ,	

Step	Keystroke	Display
Display of calculated fair value.(72298.3)		
Press , if it is not necessary to input new value.	,	
Select list mode.	2 ,	
Display of explanation for columns of following table..		
Display amortization table as list type. c1: Principal of lease (obligation/investment) c2: Lease payment each period c3: Interest expense/revenue c4: ΔPrincipal of lease (obligation/investment)		 

Example 1.4 : Depreciation

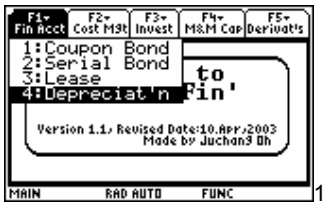
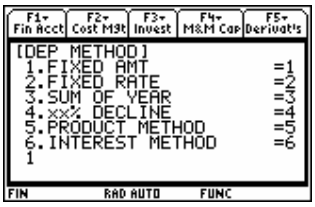
DEPRECIAT'N menu is used to analyze various depreciation methods: Straight line, Sum of the years' digits, Units of production, Fixed rate, Double declining balance, 150% declining balance.

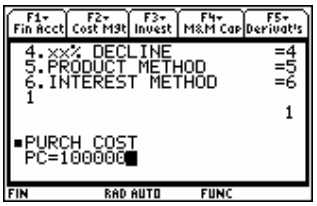
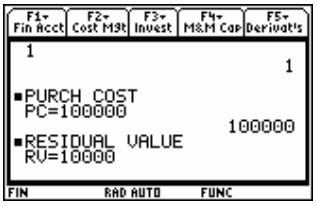
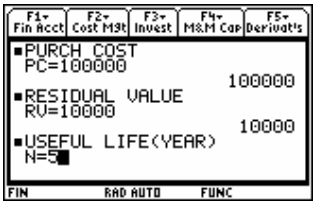
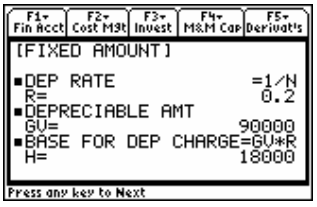
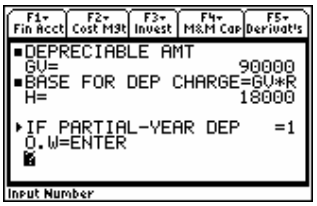
- Calculate the depreciation rate.
- Calculate the depreciation expense and accumulated depreciation each period.
- Calculate the book value of asset at the end of each period.

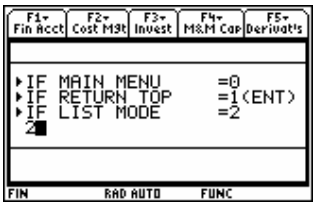
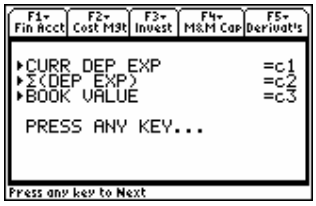
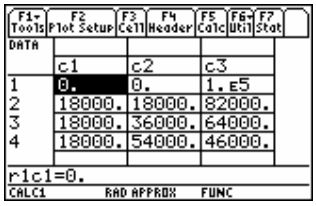
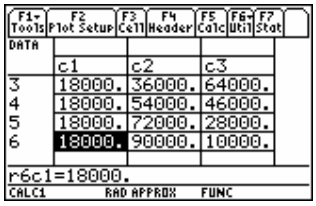
Example: Depreciation

A textile machine, purchased for $100,000 is to be depreciated over 5 years. Its residual value is estimated at $10,000. Find the depreciation expense, accumulated depreciation and the book value of asset.

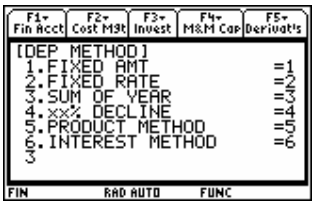
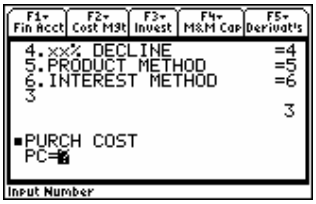
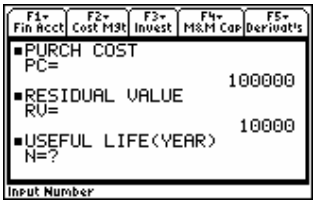
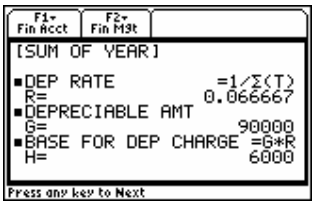
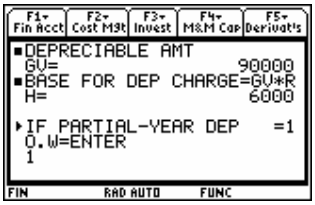
[Part1] Use the straight-line method.

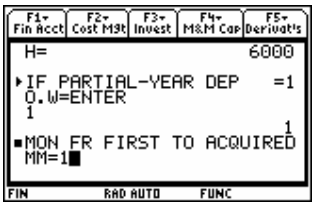
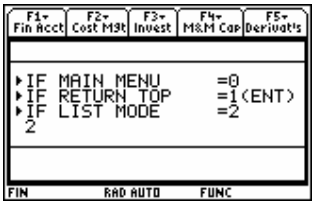
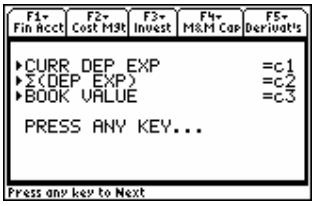
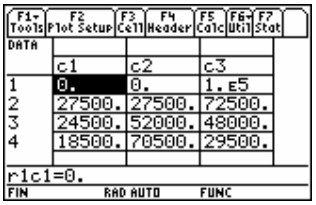
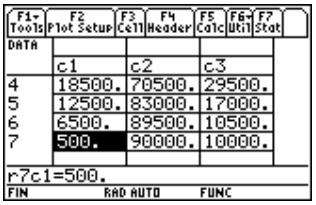
Step	Keystroke	Display
Select "Fin Acct"(Financial Accounting) category and "Depreciat'n" menu.	*f* **y**	
Select depreciation analysis method. Input '1' If fixed amount(straight line).	1 ,	

Step	Keystroke	Display
Input purchase cost.	100000 ,	
Input residual value.	1000 ,	
Input useful life.	5 ,	
Display of depreciation rate.(R=0.2) Display of depreciable amount.(G=90000) Display of base for depreciation charge. (H=18000) (Press any key to next step.)		
If the acquisition date of the asset equals the start of fiscal year, press , .	,	

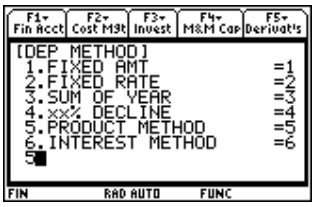
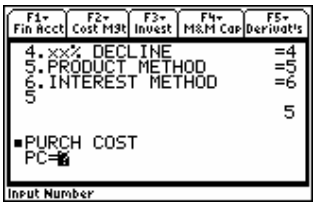
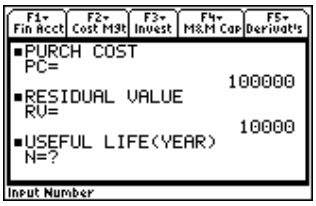
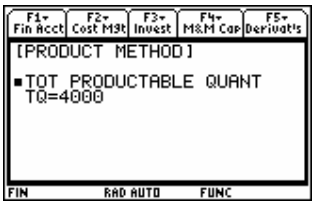
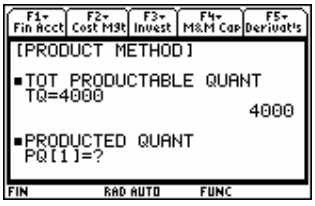
Step	Keystroke	Display
Select list mode.	2	
Display of explanation for columns of following table.		
Display of amortization table as list type. c1: Depreciation expense c2: Balance accumulated depreciation c3: Book value of asset		
		

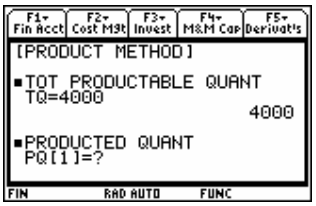
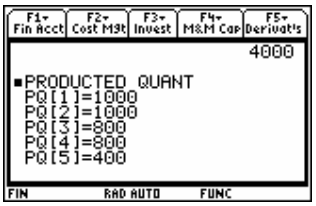
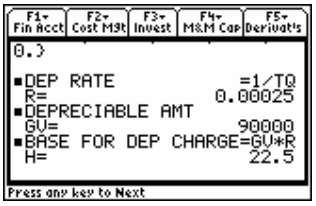
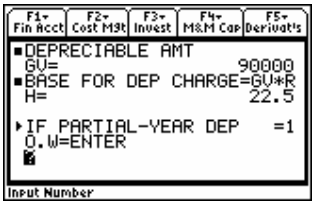
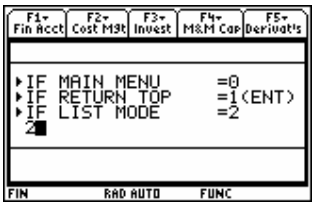
[Part2] Use the Sum of the years' digits method, assuming the first depreciation year was 11 months long.

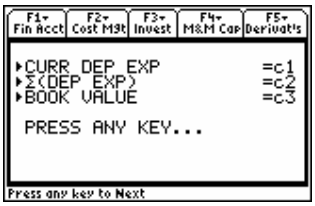
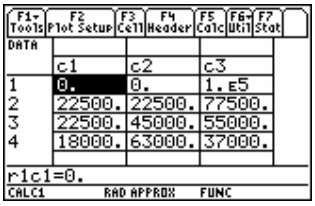
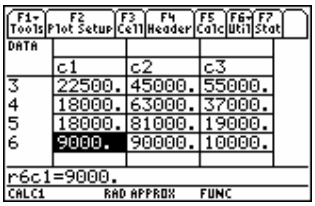
Step	Keystroke	Display
Press **2** + **a** to change list mode to CalcuFin application and then return first step in Depreciat'n.	**2** + **O**	
Input '3' if sum of year.	3 ¸	
You can see values entered and computed at the same steps as previous with only pressing ¸ . (¸ , ¸ , ¸ until following step.)	¸ ¸ ¸	 
Display of depreciation rate. (R=0.067) Display of depreciable amount. (G=90000) Display of base for depreciation charge. (H=6000) (Press any key to next step.)		
If the acquisition date of the asset does not equals the start of fiscal year, input '1'.	1 ¸	

Step	Keystroke	Display
Input the number of months from the start of fiscal year to the acquisition date of the asset in first depreciation year.	1 ,	
Select list mode.	2 ,	
Display of explanation for columns of following table.		
Display of amortization table as list type. c1: Depreciation expense c2: Balance accumulated depreciation c3: Book value of asset		 

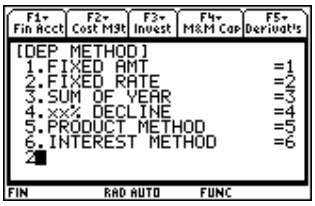
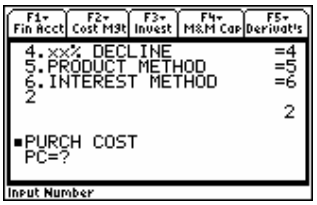
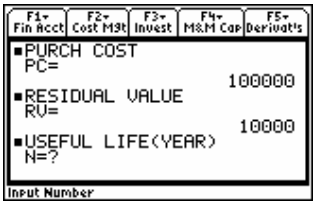
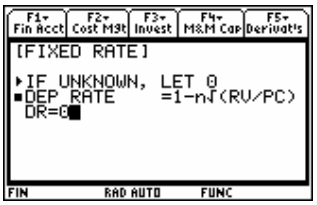
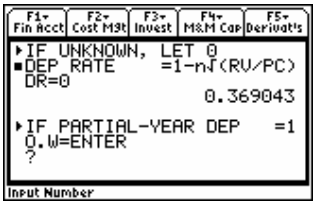
[Part3] This textile machine produced 1,000 units in the first year, 1,000 in the second, 800 in the third, 800 in the fourth, and 400 units in the last year. Its estimated total productable units is 4,000. Use the units of production method.

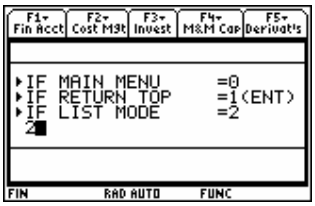
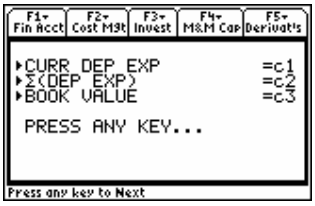
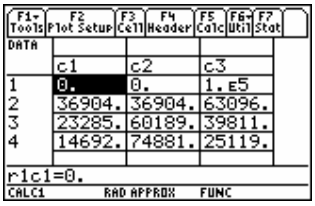
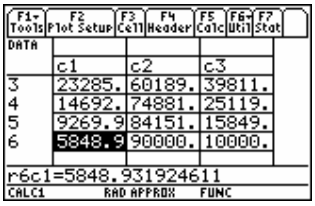
Step	Keystroke	Display
Press **2** + **a** to change list mode to CalcuFin application and then return first step in Depreciat'n.	**2** + **O**	
Input '5' if units of production method.	5 ,	
You can see values entered and computed at the same steps as previous with only pressing , . (, , , , , until following step.)	, , ,	 
Input total productable quantity.	4000 ,	
Input produced quantities per year as element of list		

Step	Keystroke	Display
Input produced quantities per year as element of list as follows. 1st year : 1000 2nd year : 1000 3rd year : 800 4th year : 800 5th year : 400	1000 , 1000 , 800 , 800 , 400 ,	 
Display of depreciation rate. (R=0.00025) Display of depreciable amount. (GV=90000) Display of base for depreciation charge. (H=22.5) (Press any key to next step.)		
If the acquisition date of the asset equals the start of fiscal year, press , .	,	
Select list mode.	2 ,	

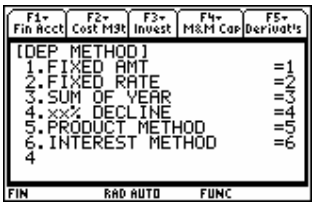
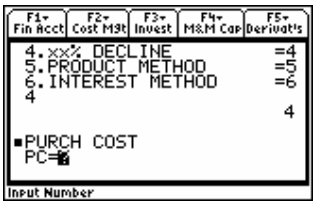
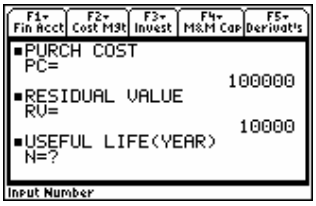
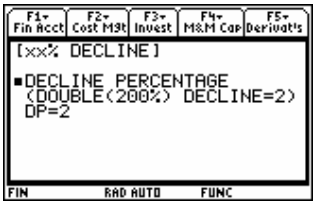
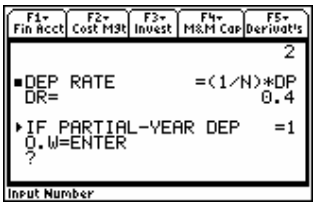
Step	Keystroke	Display
Display of explanation for columns of following table. (Press any key to next step.)		
Display of amortization table as list type. c1: Depreciation expense c2: Balance accumulated depreciation c3: Book value of asset		 

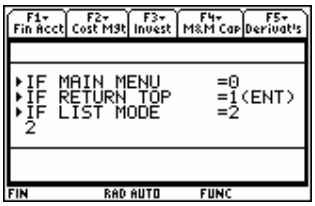
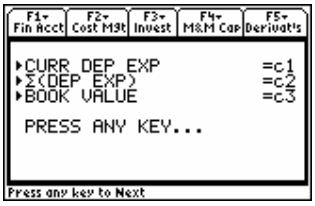
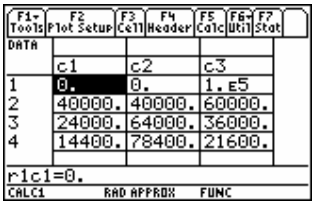
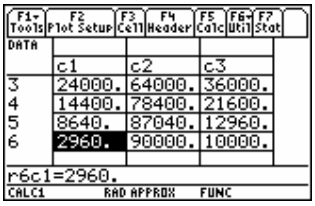
[Part4] Use the fixed rate method of accelerated depreciation method.

Step	Keystroke	Display
Input '2' if fixed rate (pure form of declining balance).	2 ,	
You can see values entered and computed at the same steps as previous with only pressing , . (, , , , until following step.)	, , ,	 
Input depreciation rate or if unkown input '0'.	0 ,	
Display of depreciation rate. (0.369043) If the acquisition date of the asset equals the start of fiscal year, press , .	, 	

Step	Keystroke	Display
Select list mode.	2	
Display of explanation for columns of following table. (Press any key to next step.)		
Display of amortization table as list type. c1: Depreciation expense c2: Balance accumulated depreciation c3: Book value of asset		 

[Part5] Use the double declining balance method.

Step	Keystroke	Display
Input '4' if double declining balance method.	4 ,	
You can see values entered and computed at the same steps as previous with only pressing , . (, , , , until following step.)	, , ,	 
Input decine percentage.	2 ,	
Display of depreciation rate. (0.4) If the acquisition date of the asset equals the start of fiscal year, press , .	, ,	

Step	Keystroke	Display
Select list mode.	2	
Display of explanation for columns of following table. (Press any key to next step.)		
Display of amortization table as list type. c1: Depreciation expense c2: Balance accumulated depreciation c3: Book value of asset		 

Examples of Cost Management

4

Example 2.1 : MFG Cost

MFG-COST menu is used to analyze production costs in the process-costing system. It calculate and draw up the statement of production cost including the spoilage cost under both weighted average method (AVE) and first-in and first-out method (FIFO). Once you've entered the basic data of the process-costing system, you can:

- Calculate the cost per equivalent unit.
- Calculate the first assigned costs of good units completed and transferred out, normal spoilage, abnormal spoilage and ending work in process.
- Calculate the second assigned costs of good units completed and transferred out and ending work in process, which the normal spoilage and abnormal spoilage costs are assigned to
- Draw up the statement of production cost including the spoilage cost.

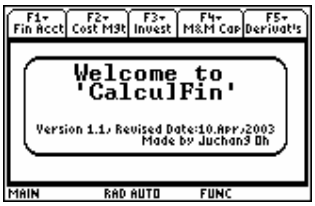
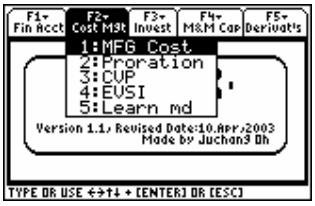
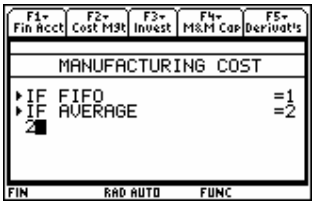
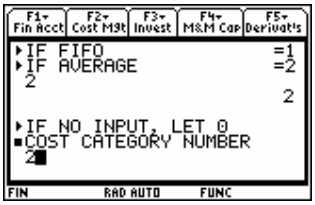
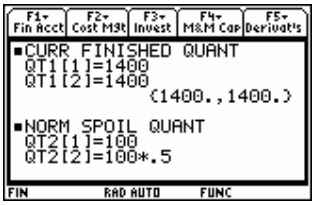
Example : Wighted-Average and FIFO method, Spoilage

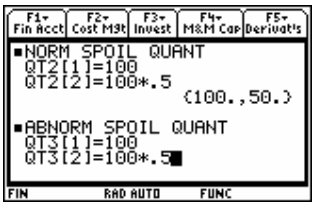
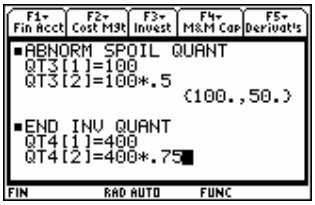
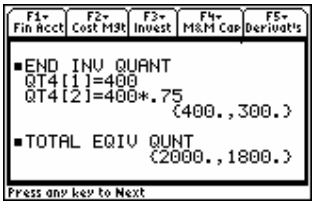
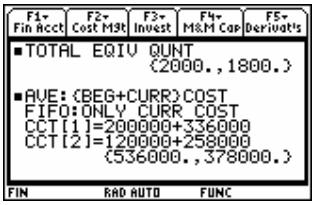
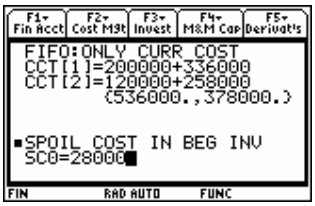
Consider the following data for the CLO company for the month of January.

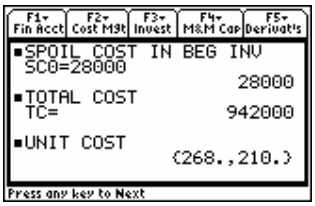
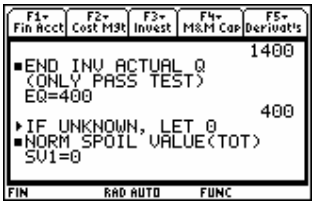
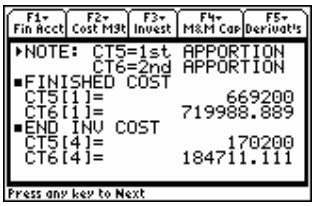
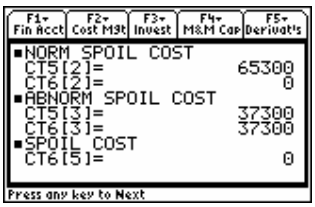
	Physical Units	Completion Degree(%)	Direct Materials	Conversion Cost
Work in process, Jan 1	800	75%	$120,000	$200,000
Started in Jan	1,200			
Good units completed And transferred out	1,400			
Normal spoilage units	100	50		
Abnormal spoilage units	100	50		
Work in process, Jan 31	400	75		
Cost added during Jan			336,000	258,000

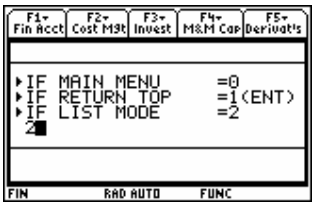
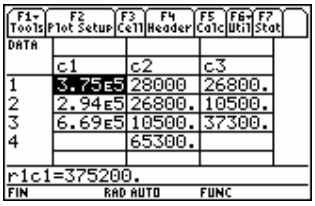
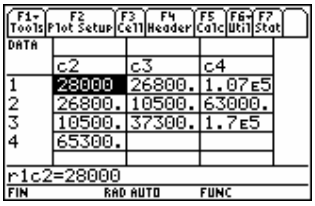
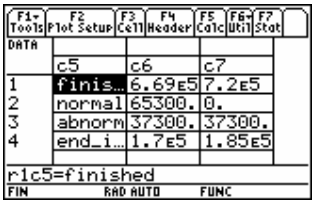
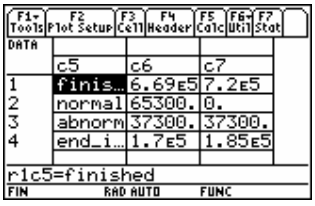
Inspection occurs when production is 50% completed. The normal spoilage costs of beginning work in process are $28,000 on January 1. Spoiled units are disposed of at zero net disposal price.

[Part 1] Summarize total costs to account for, and assign these costs to units completed, normal spoilage, abnormal spoilage and ending work in process using the weighted-average method.

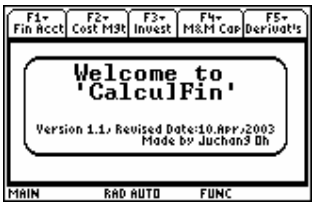
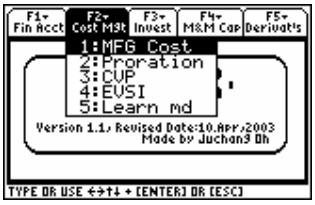
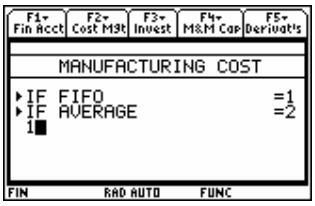
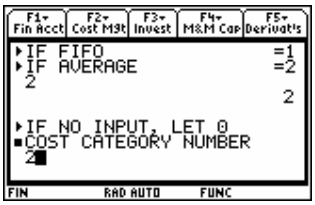
Step	Keystroke	Display
Initial screen of application. (**O** Select “FlashApps” + ¸ Select “CalcuFin” + ¸)		
Select “Cost Mgt”(Cost Management) category and “MFG Cost” menu.	„ ¸	
Select assumption of physical flow. Input 2 if the weighted-average method.	2 ¸	
Input number of cost categories. (Direct Materials, Conversion Cost) If you have already inputted data, input 0.	2 ¸	
Input equivalent units of production completed and transferred out during current period under AVE.	1400 ¸ 1400 ¸	
Input equivalent units of normal spoilage.	100 ¸ 100*.5 ¸	

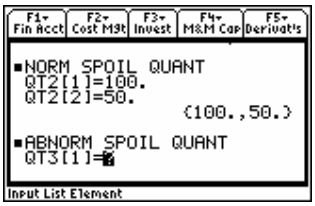
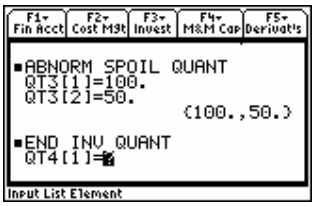
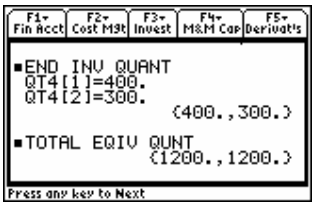
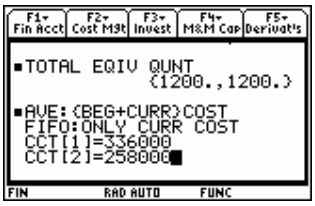
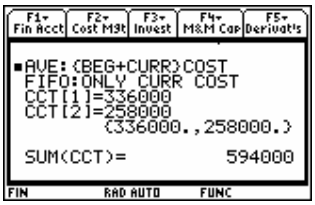
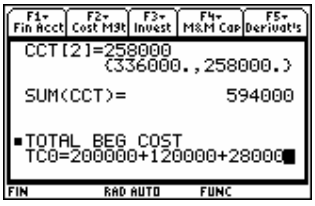
Step	Keystroke	Display
Input equivalent units of abnormal spoilage.	100 , 100*.5 ,	
Input equivalent units of ending work in process.	400 , 400*.75 ,	
Display of sum of equivalent units in each cost category. (Press any key to next step.)		
Input cost of units completed and transferred out under AVE.	200000+336000 , 120000+258000 ,	
Input spoilage cost including in the beginning inventory under AVE.	28000 ,	

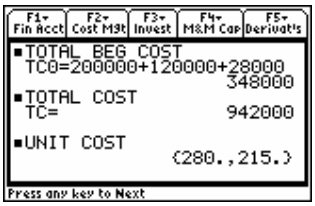
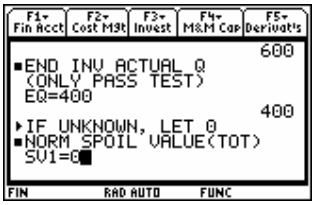
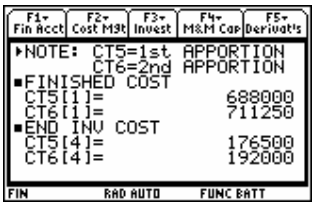
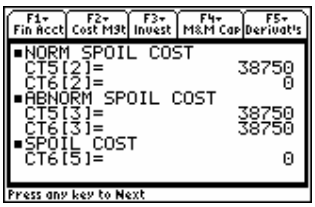
Step	Keystroke	Display
Display of total production cost. Display of total equivalent unit cost under AVE. (Press any key to next step.)		
Input physical units completed and transferred out under AVE.	800+600 ,	
Input physical units of ending work in process.	400 ,	
Input net value of normal spoilage.	0 ,	
Display of costs assigned to units completed and to units in ending work before and after apportioning normal spoilage under AVE. (Press any key to next step.)		
Display of costs assigned to normal spoilage and to abnormal spoilage before and after apportioning normal spoilage under AVE. (Press any key to next step.)		

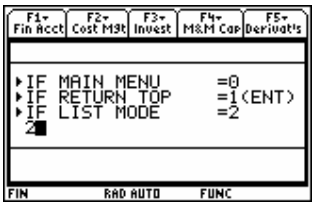
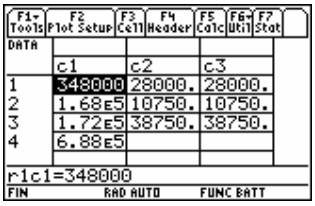
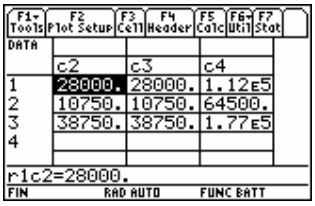
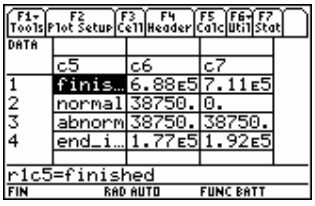
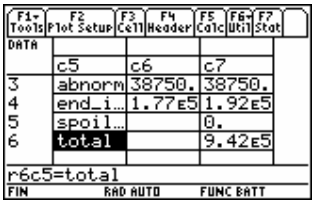
Step	Keystroke	Display
Select list mode.	2	
Display of explanation for columns of following table. (Press any key to next step.)		
Display of assigned cost as of list type.		
		
		
		

[Part 2] Summarize total costs to account for, and assign these costs to units completed, normal spoilage, abnormal spoilage and ending work in process using the FIFO method.

Step	Keystroke	Display
Initial screen of application. (**O** Select “FlashApps” + , Select “CalcuFin” + ,)		
Select “Cost Mgt”(Cost Management) category and “MFG Cost” menu.	” ,	
Select assumption of physical flow. Input 1 if FIFO.	1 ,	
You can see values entered and computed at the same steps as previous with only pressing , .	,	
Input equivalent units of production completed and transferred out during current period under FIFO.	0+1400-800 , 800*.25 +1400-800 ,	

Step	Keystroke	Display
You can see values entered and computed at the same steps as previous with only pressing ¸ . (¸ , ¸ , ¸ , .. until following step.)	¸ ¸ ¸ • • •	  
Input cost of units completed and transferred out under FIFO.	336000 ¸ 258000 ¸	
Display of sum of costs of units completed and transferred out under FIFO. (Press any key to next step.)		
Input cost including in the beginning inventory under FIFO.	28000 ¸	

Step	Keystroke	Display
Display of total production cost. Display of total equivalent unit cost under FIFO. (Press any key to next step.)		
Input physical units completed and transferred out under FIFO.	800+600 ,	
Input physical units of ending work in process.	400 ,	
Input net value of normal spoilage.	0 ,	
Display of costs assigned to units completed and to units in ending work before and after apportioning normal spoilage under FIFO. (Press any key to next step.)		
Display of costs assigned to normal spoilage and to abnormal spoilage before and after apportioning normal spoilage under FIFO. (Press any key to next step.)		

Step	Keystroke	Display
Select list mode.	2	
Display of explanation for columns of following table. (Press any key to next step.)		
Display of assigned cost as of list type.		
		
		
		

Example 2.2 : Proration

Proration menu is used to analyze the proration of manufacturing variances in a standard costing system. Once you've entered the basic data of the proration of variances, you can:

- Calculate the proration rate of each manufacturing variance.
- Calculate the proration amount of each manufacturing variance.
- Draw up a schedule table that prorates the manufacturing variances.

Example 2.3 : CVP

CVP menu is used to analyze the Cost Volume and Profit (CVP). Once you've entered the basic data of CVP, you can:

- Calculate the variables of CVP analysis for the units of sale.
- Calculate the variables of CVP analysis for the amount of sale.
- Calculate the variables of the CVP analysis for the cash flows.

Example : CVP, income taxes

To prepare for next year's marketing campaign, CLO company has prepared and presented with Mr. Oh with the following data for the current year, 2003:

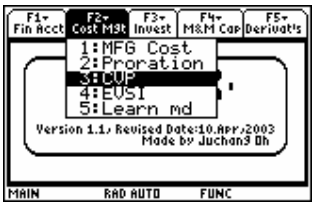
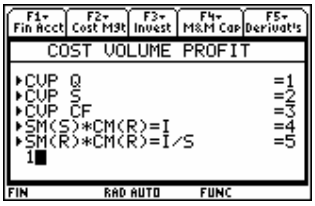
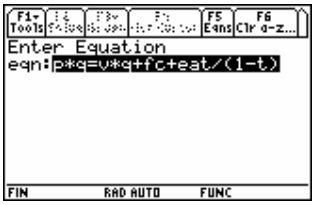
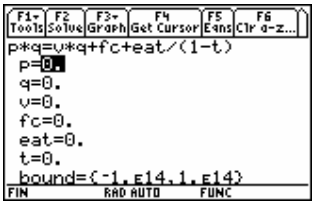
Variable costs per unit	$ 13.75
Fixed costs	135,000
Selling price per unit	25
Expected revenues, 2003 (20,000 units)	500,000
Income tax rate	40%

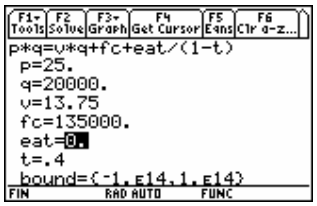
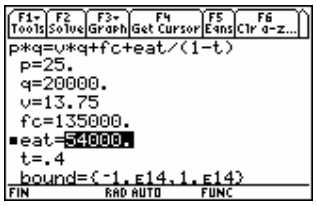
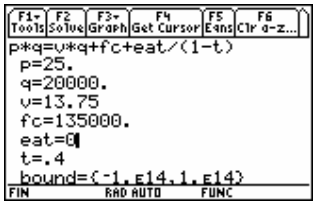
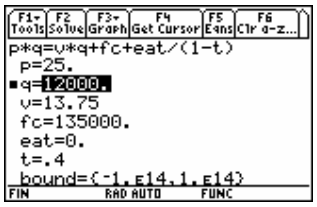
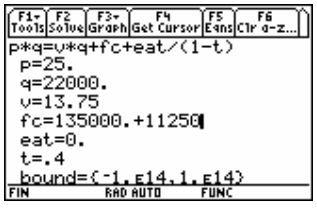
a) What is the projected net income for 2003?

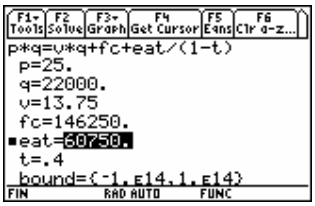
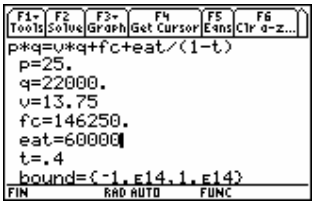
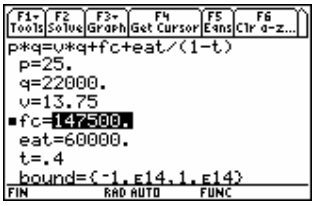
b) What is the breakeven point in units for 2003?

c) Mr. Oh has set the revenue target for 2004 at a level of $550,000 (or 22000 units). He believes an additional fixed cost of $11,250 for advertising in 2004 will be necessary to attain the revenue target. What will be the net income for 2004?

d) At a sales level of 22,000 units, what maximum amount can be spent on advertising if a 2004 net income of $60,000 is desired?

Step	Keystroke	Display
Select “Cost Mgt”(Cost Management) category and “CVP” menu.	„ a	
Select CVP Q.	1 ¸	
Display of meaning of variables in solver mode. (Press any key to next step.)		
Display of CVP Q equation.	¸	
Display of values entered and computed as below variables in above process. p : Sale Price q : Sale Quantity v : Variable Cost per unit fc : Fixed Cost t : Tax rate eat : Operating Income after tax		

Step	Keystroke	Display
Input value as below variables. p : 25 q : 20000 v : 13.75 fc : 135000 t : 0.4		
Place cursor on ‘eat’ prompt. Press „ to solve Operating Income after tax ‘eat ’.	„	
Input value of variable ‘eat‘.	0 ¸	
Place cursor on ‘q’ prompt. Press „ to solve Sale Quantity ‘q’.	0.15 ¸ 0.12 ¸	
Input value of variables ‘fc’.	135000+11250 ¸	

Step	Keystroke	Display
Place cursor on ‘eat’ prompt. Press „ to solve Operating Income after tax ‘eat ’.	„	
Input value of variable ‘eat’.	60000 ¸	
Place cursor on ‘fc’ prompt. Press „ to solve Fixed Cost ‘fc’.	„	

Example 2.4 : EVSI

EVSI menu is used to analyze the valuation of imperfect information(or sample information) by Bayesian rule. It calculates the expected value of sample information that help choose the action with higher payoff. Once you've entered the given prior data for each state, you can:

- Calculate the posterior probabilities by Bayesian rule.
- Calculate the maximum payoff under sample information.
- Calculate the maximum payoff under no sample information.
- Calculate the expected value of sample information (EVSI)

Example : Calculating the expected value of sample information (EVSI)

You can invest in stocks or bonds and faces two relevant events with uncertainty. The relevant information is given below.

1. Your projection of the payoff on these two investments is as follows.

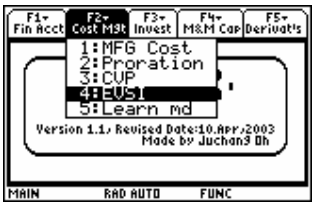
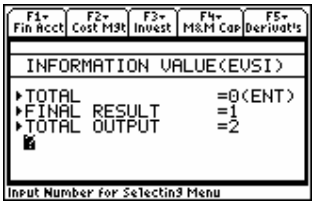
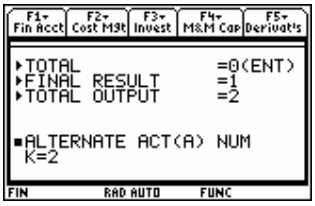
(In millions)

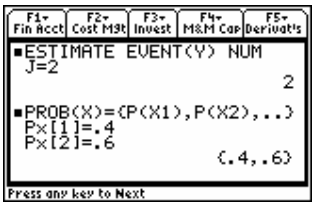
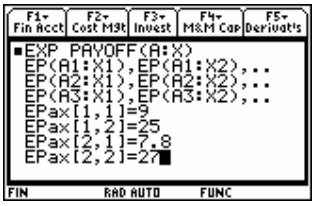
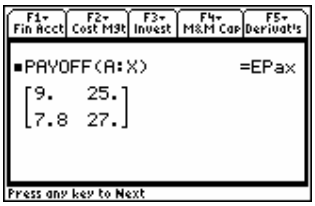
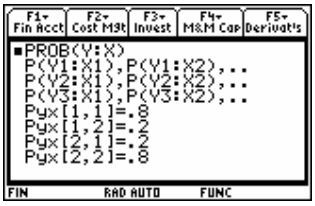
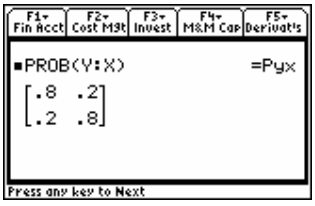
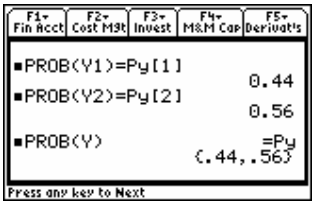
Alternative Actions	Relevant events	
	X1=Recession	X2=Boom
A1=Stock Investment	EP(A1:X1)=9	EP(A1:X2)=25
A2=Bond Investment	EP(A2:X1)=7.8	EP(A2:X2)=27

2. The probability of the relevant events, P(X1) and P(X2), equal 0.4 and 0.6.
3. An analyst can predict the outcome of relevant events with 80% accuracy.

Predicted events	Relevant events	
	X1=Recession	X2=Boom
Y1=Recession	P(Y1:X1)=0.8	P(Y1:X2)=0.2
Y2=Boom	P(Y2:X1)=0.2	P(Y2:X2)=0.8

Calculate the expected value of imperfect information that the analyst predicts the outcome of relevant events.

Step	Keystroke	Display
Select “Cost Mgt”(Cost Management) category and “EVSI” menu.	„ y	
Select the phrase of process. Press , if total process.	,	
Input number of alternative actions Being considered (=K).	2 ,	
Input number of all the relevant events that may occur (=I).	2 ,	
Input number of events that are expected to Occur by imperfect information (=J).	2 ,	

Step	Keystroke	Display
Input probability of X. P (X1) = .4 P (X2) = .6	0.4 , 0.6 ,	
Input payoff of the predicted consequences of A on X. EP (A1:X1) = 9 EP (A1:X2) = 25 EP (A2:X1) = 7.8 EP (A2:X2) = 27	9 , 25 , 7.8 , 27 ,	 
Input conditional probability of Y on X. P (Y1:X1) = .8 P (Y1:X2) = .2 P (Y2:X1) = .2 P (Y2:X2) = .8	.8 , .2 , .2 , .8 ,	 
Display of calculated Probability of Y. (Press any key to next step.)		

Step	Keystroke	Display

Display of calculated probability of X on Y under Bayesian rule.

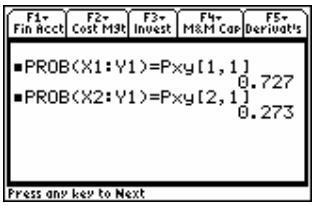
EP (X1:Y1) = .727

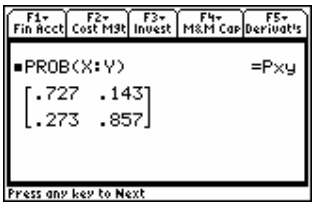
EP (X1:Y2) = .143

EP (X2:Y1) = .273

EP (X2:Y2) = .857

(Press any key to next step.)





Display of calculated payoff of the predicted consequences of A on Y.

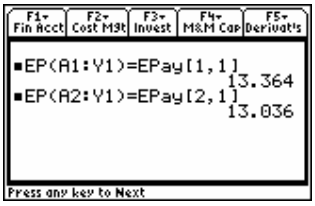
EP (A1:Y1) = 13.364

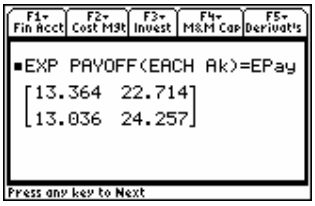
EP (A1:Y2) = 22.714

EP (A2:Y1) = 13.036

EP (A2:Y2) = 24.257

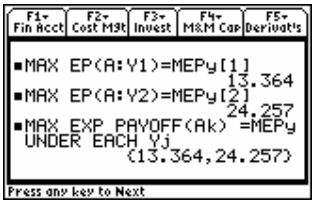
(Press any key to next step.)





Display of maximized payoff on Y.

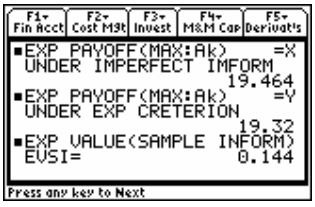
(Press any key to next step.)



Display of expected payoff under imperfect information.

Display of expected payoff under expectation criterion.

Display of expected value of sample information (EVSI).



Example 2.5 : Learn md

Learn md menu is used to analyze the nonlinear cost function of two learning model; the cumulative average-time and incremental unit-time. Once you've entered the basic data of learning model, you can:

- Calculate the cumulative average time per unit for each unit.
- Calculate the incremental unit time for each unit.
- Calculate the cumulative total time for each unit.

Examples of Investment Analysis

5

Example 3.1 : Mean-Var

MEAN-VAR menu is used to analyze risk and return on the mean-variance uncertainty. It can do statistical calculations of observations of returns and also compute risk and return for each asset and a two-asset portfolio

- Calculate the mean, variance, standard deviation, covariance, and correlation.
- Calculate the variance, standard deviation, covariance, and correlation under the Sharpe model.
- Calculate the beta(regression coefficient of market portfolio).
- Calculate the weights of the minimum variance portfolio.
- Calculate the systematic risk and unsystematic risk of each asset or a two-asset portfolio.

Example :

Calculating E(R), VAR(R), STD(R), Beta, Systematic risk, Unsystematic risk

Consider the following information on the returns on the market and two stocks A and B.

State of Economy	Probability of Occurring	Expected Return on Market(%)	Expected Return on Stock X(%)	Expected Return on Stock Y(%)
Recession	0.2	-10%	-4%	10%
Normal	0.3	20	15	12
Boom	0.5	16	12	14

[Part 1] Calculate the followings under Markowitz model.

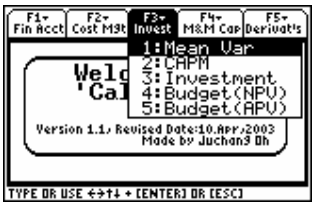
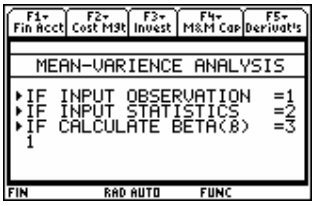
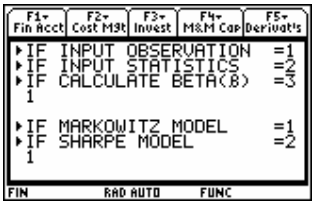
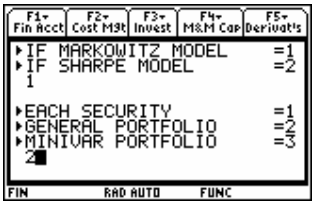
a) The expected return and standard deviation of return of each stock.

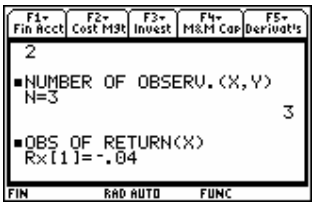
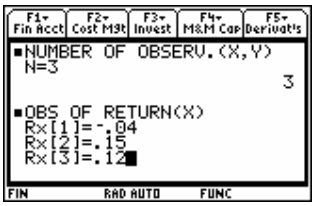
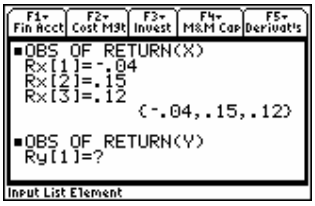
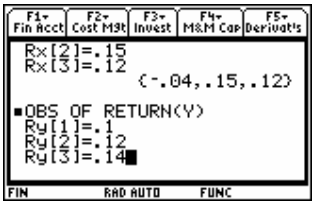
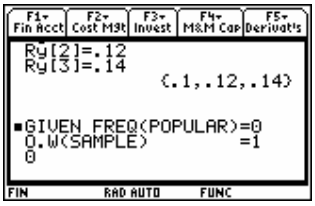
b) The covariance and correlation between the two stocks.

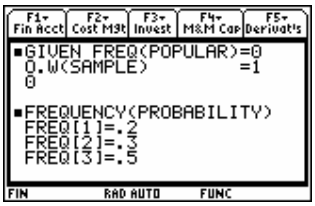
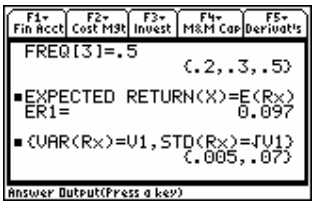
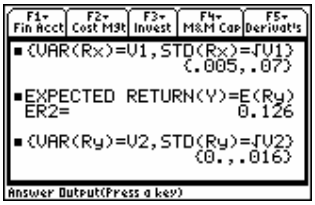
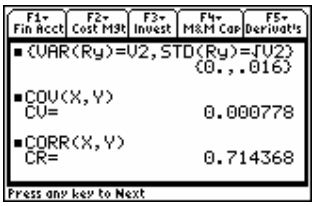
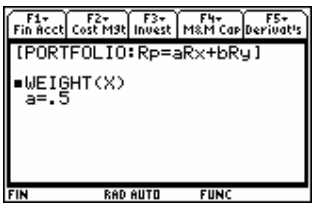
c) The expected return and standard deviation of return of a portfolio that is 50% in stock X.

d) The portfolio that has the minimum variance of stock X and stock Y.

e) The expected return and standard deviation of return of the minimum variance portfolio of stock X and stock Y.

Step	Keystroke	Display
Select “Invest”(Investment Analysis) category and “Mean-Var” menu.	„ ¸	
Select data input method. Input ‘1’ if input observation data.	1 ¸	
Select Markowitz model.	1 ¸	
Select object to analyze. Input ‘2’ if analyze general two-asset portfolio.	2 ¸	
Input number of observations.	3 ¸	

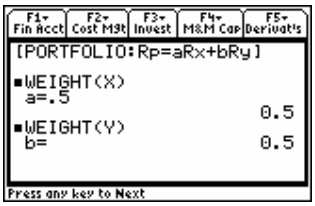
Step	Keystroke	Display
Input observation of return on X as element of list. Rx[1] : - 0.04 Rx[2] : 0.15 Rx[3] : 0.12	- 0.04 , 0.15 , 0.12 ,	 
Display of observations of return on X as list type. Input observation of return on Y as element of list.		
Ry[1] : 0.1 Ry[2] : 0.12 Ry[3] : 0.14	0.1 , 0.12 , 0.14 ,	
Display of observations of return on Y as list type. Set data type(popular or sample). Input ‘0’ if popular data. (In this case, frequency of observations is given.)	0 ,	

Step	Keystroke	Display
Input frequency of observation as element of list. FREQ(1) : 0.2 FREQ(2) : 0.3 FREQ(3) : 0.5	0.2 , 0.3 , 0.5 ,	
Display of calculated mean return on X. Display of calculated variance and standard deviation on X. (Press any key to next step.)		
Display of calculated mean return on Y. Display of calculated variance and standard deviation on Y. (Press any key to next step.)		
Display of calculated covariance and correlation between two stocks (X,Y). (Press any key to next step.)		
Let P to be a two-asset portfolio of X and Y. Input portfolio weight of X.	0.5 ,	

Step	Keystroke	Display

Display of portfolio weight of Y.

(Press any key to next step.)

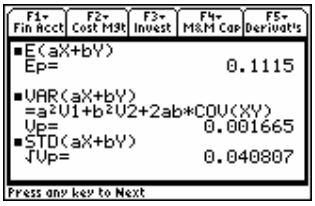


Display of calculated mean return on portfolio P.

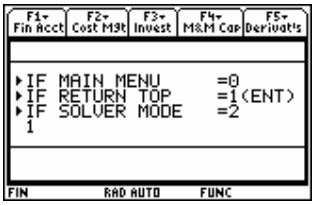
Display of calculated variance on portfolio P.

Display of calculated standard deviation on portfolio P.

(Press any key to next step.)

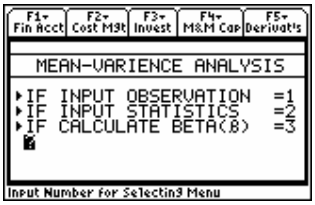


Input '1', if you want to return to first step again.



It's first step again.

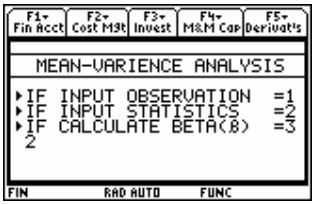
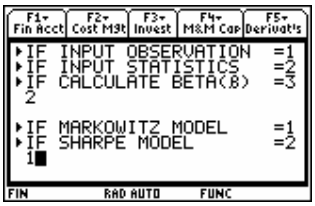
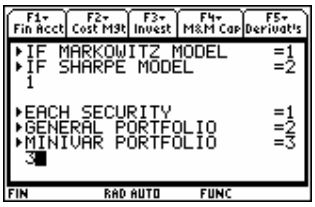
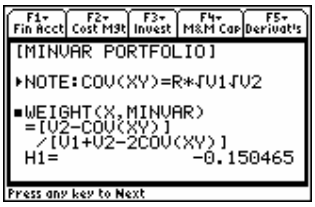
(to be continued in following Part 2)

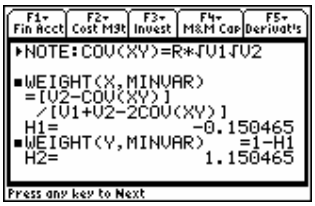
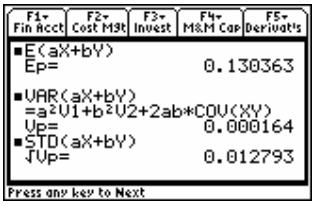


[Part 2] Calculate the followings under Markowitz model.

a) The portfolio that has the minimum variance of stock X and stock Y.

b) The expected return and standard deviation of return of the minimum variance portfolio of stock X and stock Y.

Step	Keystroke	Display
Select data input method. Input '2' if input observation data.	2 ,	
Select Markowitz model.	1 ,	
Select object to analyze. Input '3' if analyze minimum variance portfolio.	3 ,	
You can see values entered and computed at the same steps as Part 1 with only pressing , . (, , , , ….. until following step.) and then do same step as previous.	, • • •	• • •
Display of calculated minimum variance portfolio weight of X. (Press any key to next step.)		

Step	Keystroke	Display
Display of calculated minimum variance portfolio weight of Y. (Press any key to next step.)		
Display of calculated mean return on minimum variance portfolio. Display of calculated variance on minimum variance portfolio. Display of calculated standard deviation on minimum variance portfolio.		

[Part 3] Calculate the followings under Sharpe model.

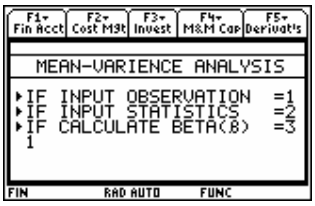
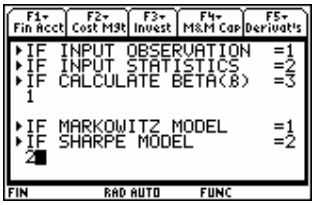
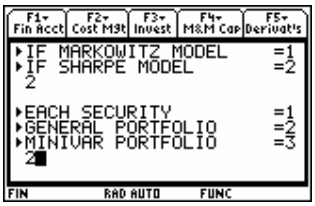
a) The beta of each stock.

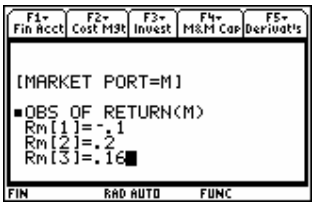
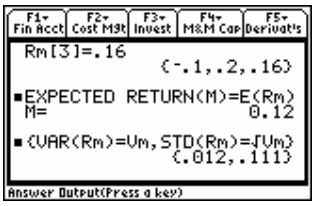
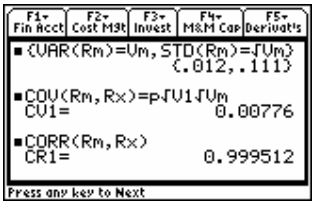
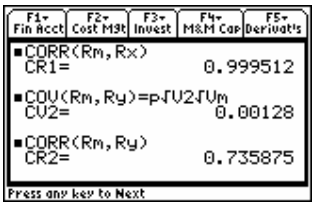
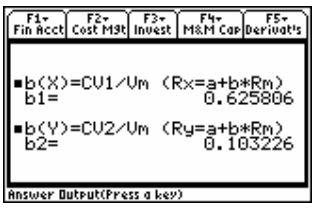
b) The systematic risk and unsystematic risk of each stock.

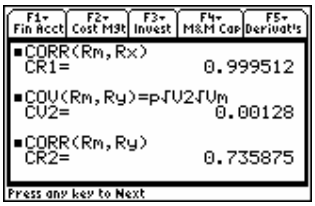
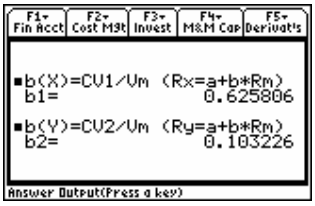
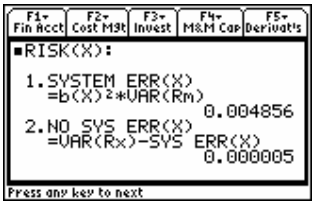
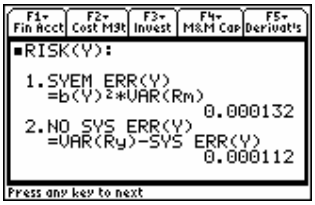
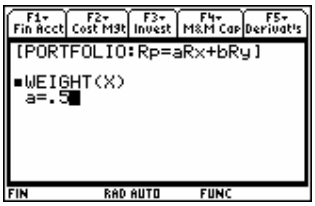
c) The covariance and correlation between the two stocks.

c) The expected return and standard deviation of return of a portfolio that is 50% in stock X.

d) The systematic risk and unsystematic risk of a portfolio that is 50% in stock X.

Step	Keystroke	Display
Select data input method. Input '1' if input observation data.	1 ,	
Select Sharpe Model.	2 ,	
Select object to analyze. Input '2' if analyze general two-asset portfolio.	3 ,	
You can see values entered and computed at the same steps as Part 1 with only pressing , . (, , , , ….. until following step.) and then do same step as previous.	, • • •	• • •

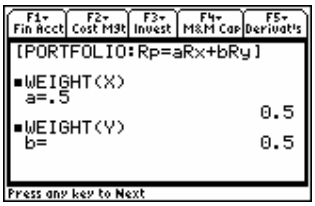
Step	Keystroke	Display
Input observations of return on market portfolio as elements of list. Rm[1] : - 0.1 Rm[2] : 0.2 Rm[3] : 0.16	- 0.1 , 0.2 , 0.16 ,	
Display of calculated mean return on market portfolio. Display of calculated variance and standard deviation on market portfolio. (Press any key to next step.)		
Display of calculated covariance and correlation between X and market portfolio. (Press any key to next step.)		
Display of calculated covariance and correlation between Y and market portfolio. (Press any key to next step.)		
Display of calculated beta of X. Display of calculated beta of Y. (Press any key to next step.)		

Step	Keystroke	Display
Display of calculated covariance and correlation between Y and market portfolio. (Press any key to next step.)		
Display of calculated beta of X. Display of calculated beta of Y. (Press any key to next step.)		
Display of calculated systematic risk and unsystematic risk of X. (Press any key to next step.)		
Display of calculated systematic and unsystematic risk of Y. (Press any key to next step.)		
Let P to be a two-asset portfolio of X and Y. Input portfolio weight of X.	0.5 ,	

Step	Keystroke	Display

Display of portfolio weight of Y.

(Press any key to next step.)

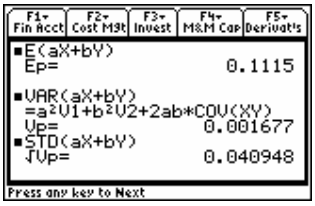


Display of calculated mean return on portfolio P.

Display of calculated variance on portfolio P.

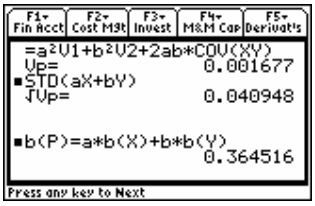
Display of calculated standard deviation on portfolio P.

(Press any key to next step.)

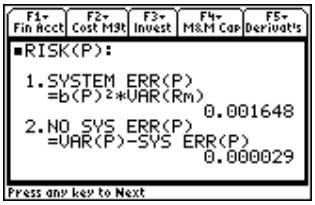


Display of calculated beta of a two-asset portfolio of X and Y.

(Press any key to next step.)



Display of calculated systematic risk and unsystematic risk of portfolio P.



Example 3.2 : CAPM

CAPM menu is used to analyze risk and return on the CAPM model. It can do statistical calculations of observations of returns for market portfolio and an asset and also compute risk and return for the asset.

- Calculate the mean, variance, standard deviation, covariance, and correlation.
- Calculate the beta(regression coefficient of market portfolio) and required rate of return.
- Calculate the capital market line(CML), security market line(SML), and regression line

Example : Calculating E(R), VAR(R), Covariance, Beta, Required rate of return

Consider the following information on the returns on the market and CLO company.

State	Probability	Market Return R_m	Return for the Firm R_j
1	.1	-.15%	-.30
2	.3	.05	.00
3	.4	.15	.20
4	.2	.20	.50

[Part 1] The risk-free rate is 6%. Calculate the following:

a) The expected market return.

b) The variance of the market return

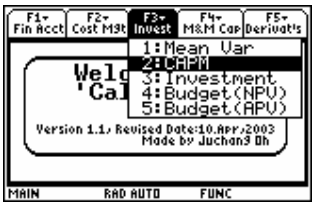
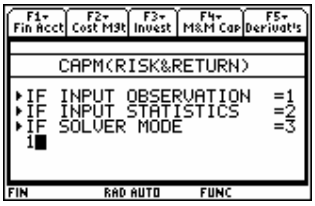
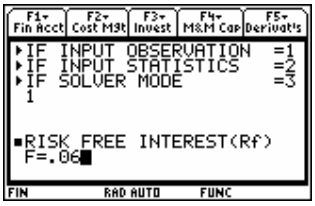
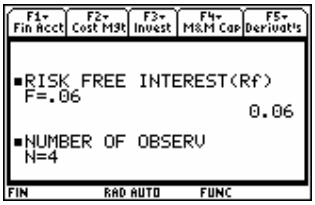
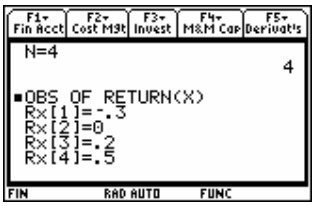
c) The expected return for the CLO company

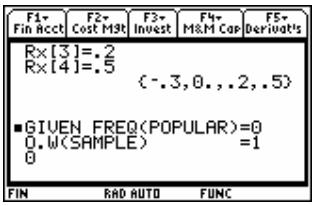
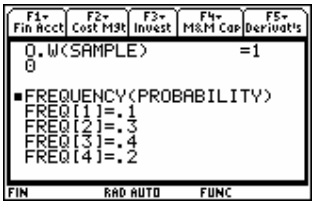
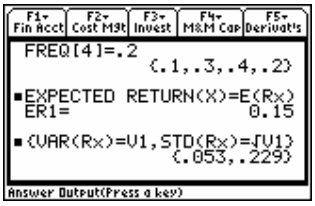
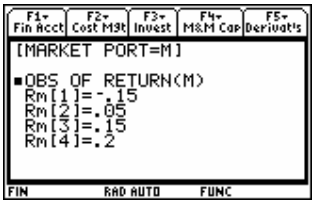
d) The covariance of the return for the CLO company with the market return.

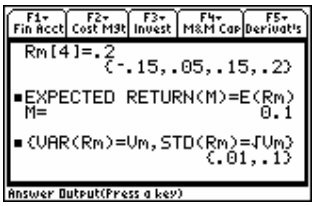
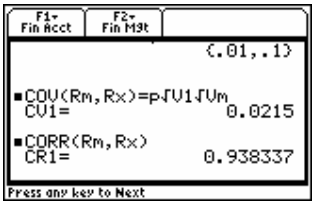
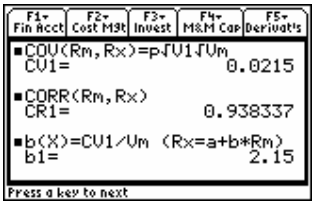
e) Write the equation of the capital market line. What is the required return for the CLO company.

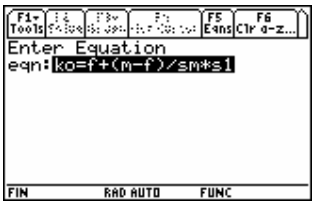
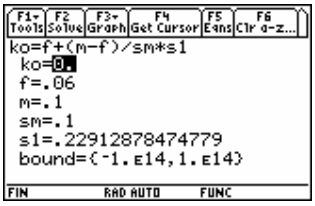
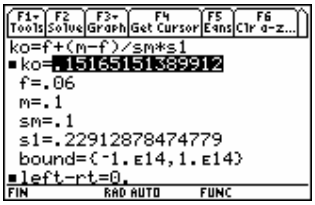
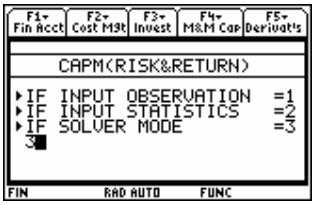
f) Write the equation of the security market line. What is the required return for the CLO company.

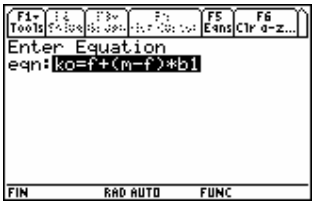
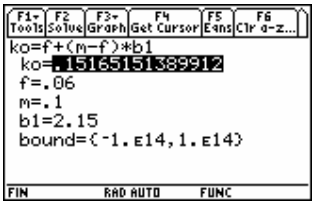
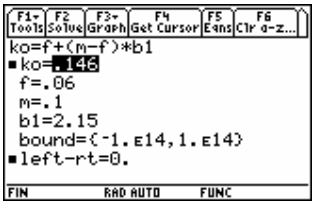
g) Write the regression equation of the regression line $R_j=a+ b*R_m$.

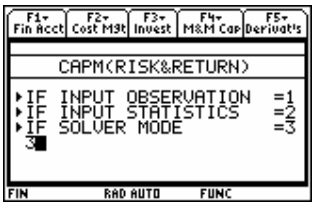
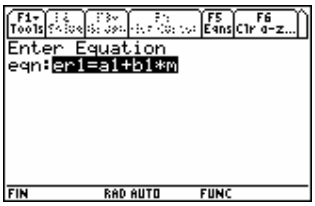
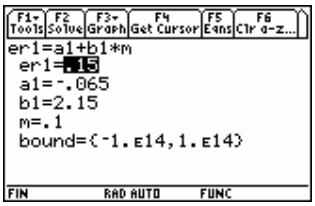
Step	Keystroke	Display
Select “Invest”(Investment Analysis) category and “CAPM” menu.	... ©	
Select data input method. Input ‘1’ if input observation data.	¨ ,	
Input risk free interest rate.	0.06 ,	
Input number of observations.	4 ,	
Input observations of return on X as elements of list. Rx[1] : - 0.3 Rx[2] : 0 Rx[3] : 0.2 Rx[4] : 0.5	- 0.3 , 0 , 0.2 , 0.5 ,	

Step	Keystroke	Display
Set data type (popular or sample). Input '0' if popular data (In this case, frequency of observations is given.)	μ ,	
Input frequency of observation as element of list. FREQ(1) : 0.1 FREQ(2) : 0.3 FREQ(3) : 0.4 FREQ(4) : 0.2	0.1 , 0.3 , 0.4 , 0.2 ,	
Display of calculated mean return on X. Display of calculated variance and standard deviation on X. (Press any key to next step.)		
Input observations of return on market portfolio as elements of list. Rm[1] : - 0.15 Rm[2] : 0.05 Rm[3] : 0.15 Rm[3] : 0.2	- 0.15 , 0.05 , 0.15 , 0.2 ,	

Step	Keystroke	Display
Display of calculated mean return on market portfolio. Display of calculated variance and standard deviation on market portfolio. (Press any key to next step.)		
Display of calculated covariance and correlation between X and market portfolio. (Press any key to next step.)		
Display of calculated beta of X. (Press any key to next step.)		
Input ‘2’, if you want to go to solver mode.	©	
Input ‘1’, if you want to select “CML”.	¨	

Step	Keystroke	Display
Display of meaning of variables in solver mode. f : Risk Free Interest Rate m : Market Interest Rate sm : Standard Deviation on M s1 : Standard Deviation on X ko : Required Return Rate on X		
Display of CML equation. (,)	,	
Display of values entered and computed as below variables in above process. f : Risk Free Interest Rate m : Market Interest Rate sm : Standard Deviation on M s1 : Standard Deviation on X		
Place cursor on 'ko' prompt. Press „ to solve Required Return Rate on X 'ko'. Note: This solution is meaningless since X is not an efficient Portfolio.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in CAPM.	**2** **a**	
Input '3', if you want to go to solver mode.	**a** ,	

Step	Keystroke	Display
Input ‘2’, if you want to select “SML”.	© ¸	
Display of meaning of variables in solver mode. f : Risk Free Interest Rate m : Market Interest Rate b1 : beta of X er1 : Required Return Rate on X		
Display of SML equation. (¸)	¸	
Display of values entered and computed as below variables in above process. ko : Required Return Rate on X f : Risk Free Interest Rate m : Market Interest Rate b1 : beta of X		
Place cursor on ‘ko’ prompt. Press „ to solve Required Return Rate on X ‘ko’.	„	

Step	Keystroke	Display
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in CAPM.	**2** **a**	
Input '3', if you want to go to solver mode.	**a** ¸	
Input '3', if you want to select "REGRESSION".	**a** ¸	
Display of meaning of variables in solver mode. er1 : Mean of Retrun Rate on X a1 : Constant of Regression b1 : Coefficient of X (beta of X) m : Market Interest Rate		
Display of Regression equation. (¸)	¸	
Display of values entered and computed as below variables in above process. er1 : Mean of Return Rate on X a1 : Constant of Regression b1 : Coefficient of X (beta of X) m : Market Interest Rate		

Example 3.3 : Investment

INVESTMENT menu is used to analyze cash flows(money received or money paid out) of uneven amounts for investment decision. There are five widely used capital budgeting techniques in this menu. You can:

- Calculate the net present value(NPV).
- Calculate the internal rate of return(IRR) and Modified internal rate of return.
- Calculate the accounting rate of return(ARR).
- Calculate the annual equivalent value(AEV).
- Calculate the profitability index(PI) and weighted average profitability index (WAPI).

Example: Calculating NPV, IRR, AEV of an Investment

[Part1] You make an initial investment of $80,000, and expect returns over the next five years as illustrated in figure 1.

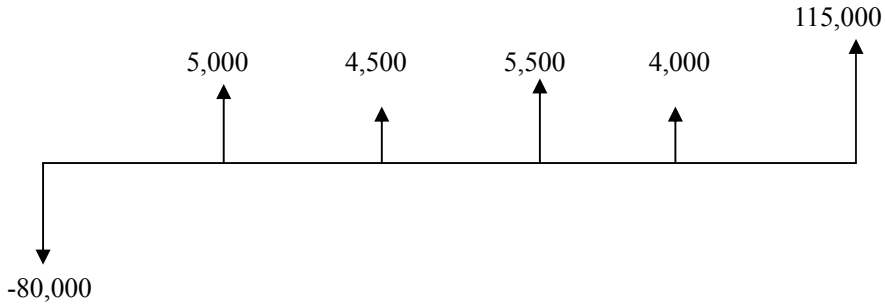
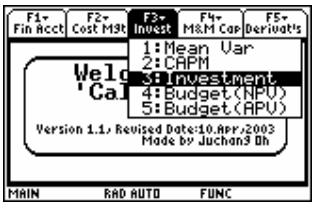
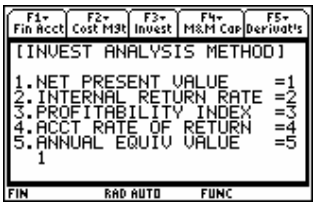
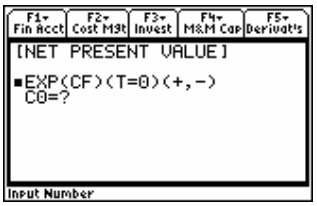
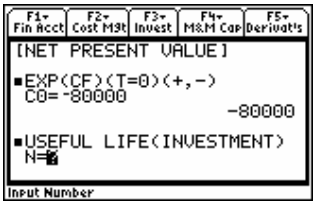
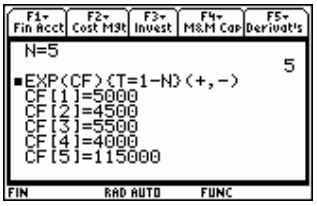
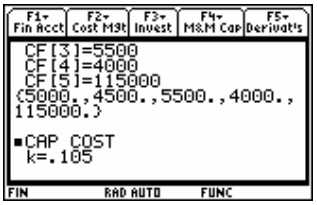
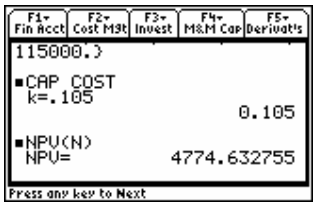
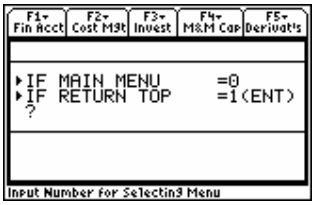
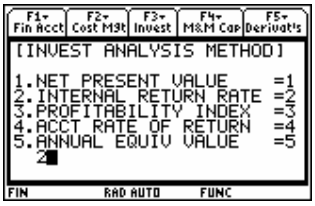
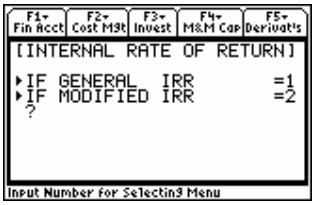


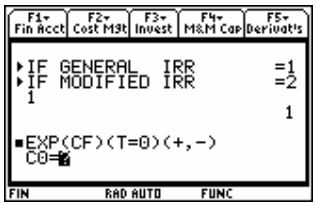
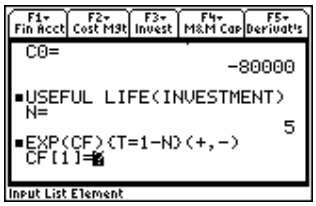
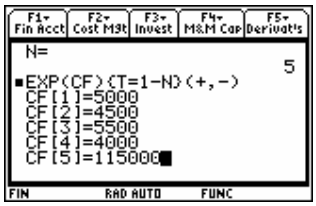
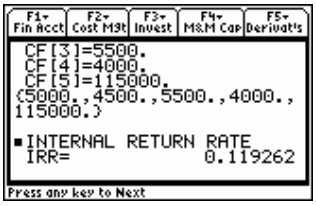
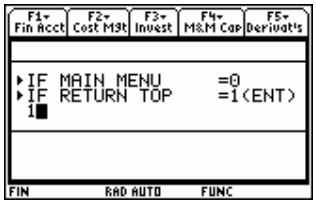
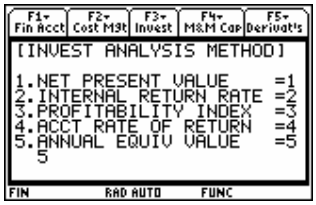
Figure 1. Cash Flows for an Investment

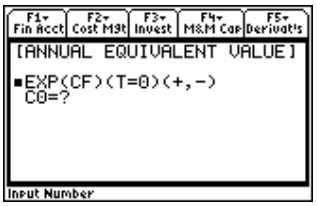
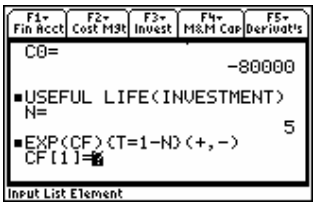
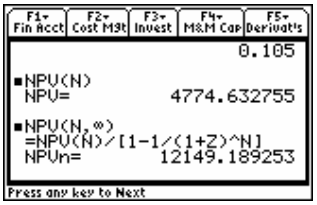
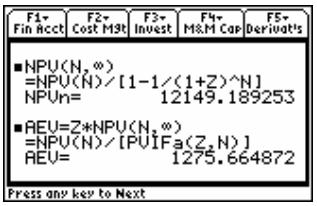
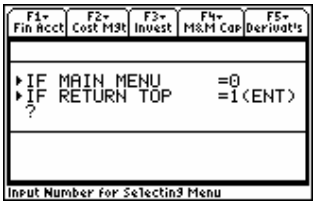
Calculate NPV, IRR, AEV, assuming an annual interest rate of 10.05%.

Step	Keystroke	Display
Select “Invest”(Investment Analysis) category and “Investment” menu.	„ ©	

Step	Keystroke	Display
Select investment analysis method. Input '1' if analysis method is NPV.	1 ,	
Input initial cash flow.	-80000 ,	
Input useful life of investment	5 ,	
Input cash flows from t=1 to t=5 as list type.	5000 , 4500 , 5500 , 4000 , 115000 ,	
Input cost of capital.	0.105 ,	

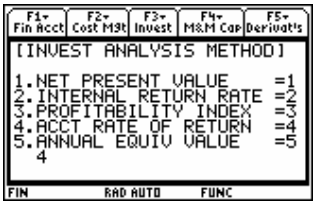
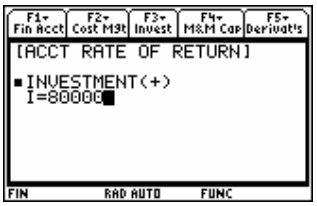
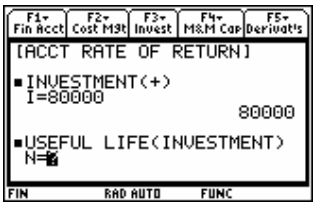
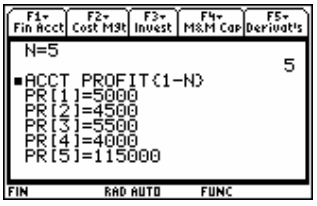
Step	Keystroke	Display
Display of calculated NPV. (Press any key to next step.)		
Input '1' to return to the first step again.	1 ,	
Select investment analysis method. Input '2' if analysis method is IRR.	2 ,	
Input 1 if you want to analyze general IRR	1 ,	

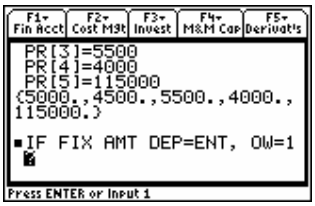
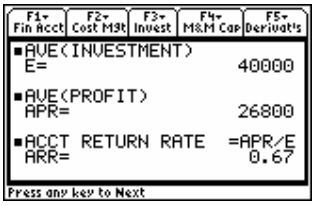
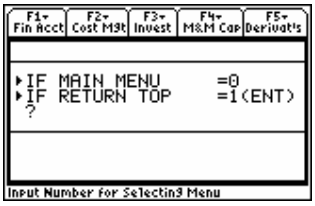
Step	Keystroke	Display
You can see values entered and computed at the same steps as previous with only press . (, , , …until following step.) (since the same value as previous is stored.)	, , , • • •	  
Display of calculated IRR. (Press any key to next step.)		
Input ‘1’ to return to the first step again.	1 ,	
Select investment analysis method. Input ‘5’ if analysis method is AEV.	5 ,	

Step	Keystroke	Display
You can see values entered and computed at the same steps as previous with only pressing , . (, , , , ….. until following step.)	, • • •	  • •
Display of calculated NPV. (Press any key to next step.)		
Display of calculated AEV. (Press any key to next step.)		
Input ‘1’ to return top of “investment” menu.		

[Part2] Assume, for the sake of convenience, that the numbers of figure 1 are an initial investment of $80,000 and accounting profits over the next five years.

Calculate ARR, in case that the investment is depreciated by the straight-line method.

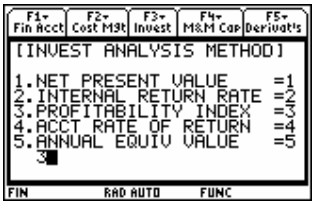
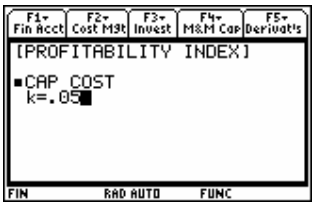
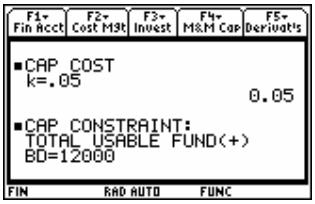
Step	Keystroke	Display
Input '4' if analysis method is ARR.	4 ,	
Input initial investment.	80000 ,	
Input useful life of investment.	5 ,	
Input account profit as list type.	5000 , 4500 , 5500 , 4000 , 115000 ,	

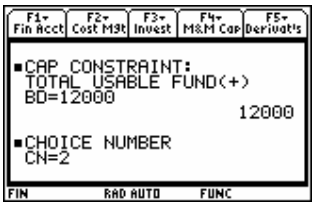
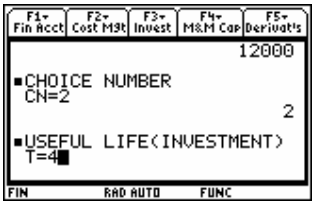
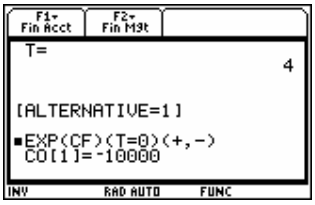
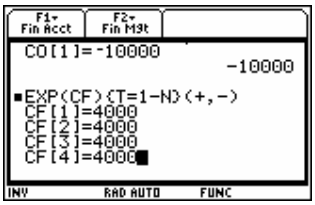
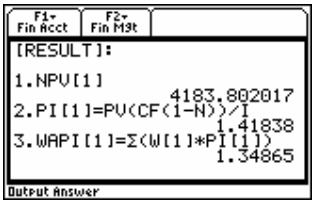
Step	Keystroke	Display
Press , if investment is depreciated by straight-line method.	,	
Display of calculated average of investment. (40000) Display of calculated average of profit. (26800) Display of calculated ARR.(0.67)		
Input '1' to return top of "investment" menu.	,	

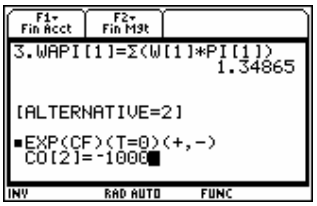
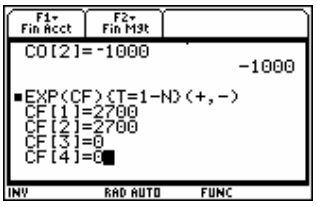
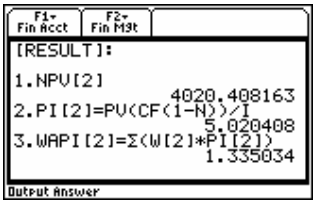
[Part3] You are considering two mutually exclusive projects. They are the only projects available. The risk free rate is 5%. The cash flow from projects is given below:

Year	Project 1	Project 2
0	-10,000	-1,000
1	4,000	2,700
2	4,000	2,700
3	4,000	
4	4,000	

Calculate PI, WAPI, if you have a capital constraint of $12,000.

Step	Keystroke	Display
Select "Invest"(Investment Analysis) category and "Investment" menu and input '3' if analysis method is PI, WPI.	3 ,	
Input cost of capital.	0.05 ,	
Input amount of capital constraint.	12000 ,	

Step	Keystroke	Display
Input number of project .	2 ›	
Input maximum of useful lives of projects.	4 ›	
[Case of project 1]		
Input initial cash flow.	-100000 ›	
Input cash flows from t=1 to t=4 as list type.	4000 › 4000 › 4000 › 4000 ›	
Display of calculated NPV. Display of calculated PI. Display of calculated WAPI. (Press any key to next step.)		

Step	Keystroke	Display
[Case of project 2]		
Input initial cash flow.	-1000 ➘	
Input cash flows from t=1 to t=4 as list type.	2700 ➘ 2700 ➘ 0 ➘ 0 ➘	
Display of calculated NPV. Display of calculated PI. Display of calculated WAPI. (Press any key to next step.)		

Example 3.4 : Budget(NPV)

Budget (NPV) menu is used to analyze the net present value of the cash flows of firm's operation for capital budgeting purposes.

Example 3.5 : Budget(APV)

Budget (APV) menu is used to analyze the Adjusted Present Value (APV) for capital budgeting purposes. Once you've entered the basic data of APV, you can:

- Calculate the NPV of the project to an unlevered firm (Base case NPV).
- Calculate the NPV of financing side effects (NPVF);
  Tax subsidy to debt, Costs of issuing new securities, and Subsidies to debt financing

Examples of M&M Capital Structure

6

Example 4.1 : Leverage

Leverage menu is used to analyze business and financial risk; It can display and calculate followings through Numeric Solver mode.

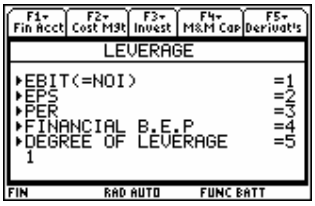
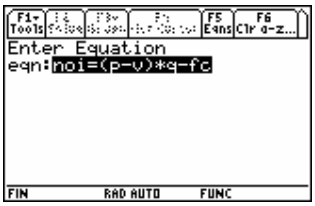
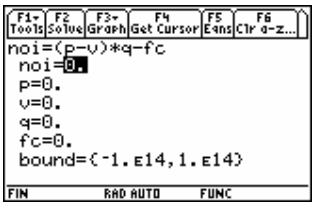
- Calculate EBIT(Earnings before interest and taxes), EPS(Earnings per share), PER (Price/earnings ratio).
- Calculate Financial Breakeven Point.
- Calculate DOL(Degree of Operating Leverage), DFL(Degree of Financial Leverage), DCL(Degree of Conbining Leverage).

Example : Calculating EBIT, EPS, PER, FINANCIAL BEP, DOL, DFL, DCL

CLO company produce a single product at a price of $12 per unit. CLO's fixed costs total $675,000, and its variable costs are $6.75 per unit. CLO has sales 200,000 units. To support operations, CLO requires $2,250,000 in assets, and it has established a debt ratio of 40 percent. The cost of debt is k_d = 10 percent. CLO has 50,000 shares of common stock outstanding; each share sells for $5.24. CLO pays a constant dividend of $40,000 per year for prefered stock. The tax rate is 40 percent, and fixed costs do not include interest. Calculate the following:

[Part 1]

a) EBIT(Earnings before interest and taxes)
b) EPS(Earnings per share)
c) PER(Price/earnings ratio)
d) Financial Break Even Point
e) DOL(Degree of operating leverage)
f) DFL(Degree of financial leverage)
g) DCL(Degree of conbining leverage)

Step	Keystroke	Display
Select “M&M Cap”(M&M Capital Structure) category and “Leverage” menu.	„ ,	
Input ‘1’, if you want to selerct “EBIT” solver mode.	1 ,	
Display of meaning of variables in solver mode. p : Sale Price v : Variable Cost per unit q : Sale Quantity fc : Fixed Cost noi: Net Operating Income(=EBIT)		
Display of EBIT equation. (,)	,	
Display of values entered and computed as below variables in previous process.		

Step	Keystroke	Display

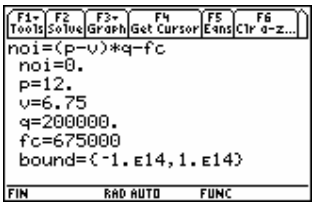
Input value as below variables.

p : 12

v : 6.75

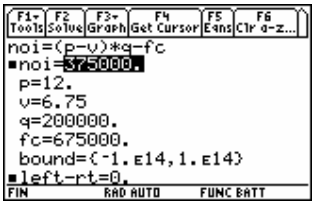
q : 200000

fc : 675000



Place cursor on ‘ebit’ prompt. „

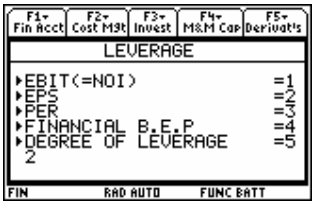
Press „ to solve EBIT ‘ebit’.



Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Lverage. **2** **O**

Input ‘2’, if you want to go to “EPS” solver mode. 2

,



Display of meaning of variables in solver mode.

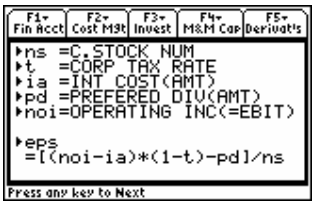
ns : Number of Common Stock Outstanding

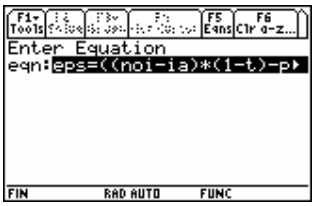
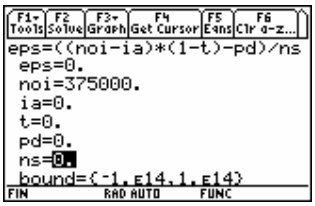
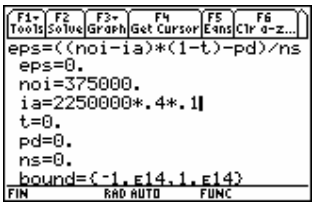
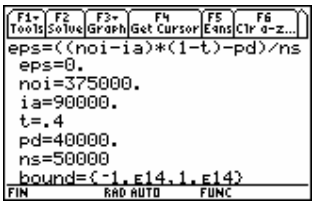
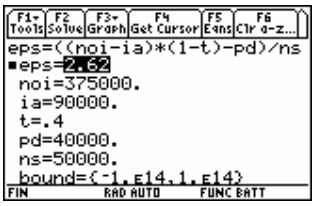
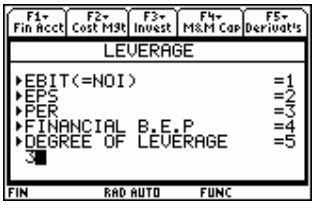
t : Tax Rate

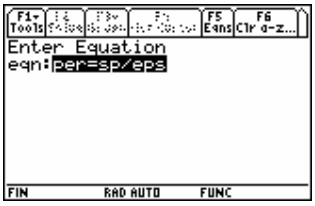
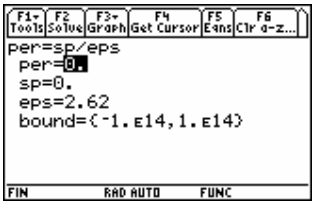
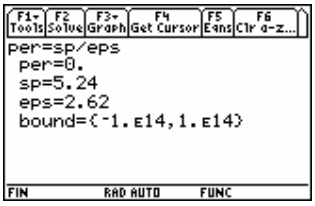
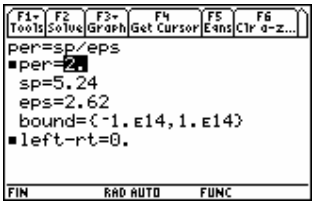
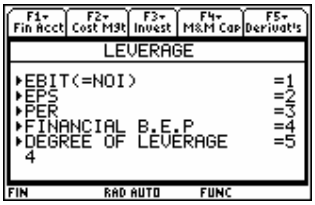
ia : Interest Expense

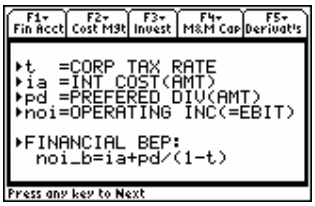
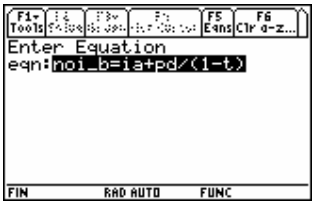
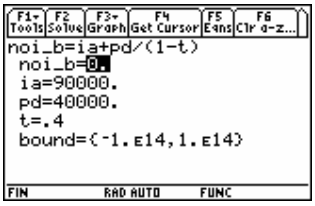
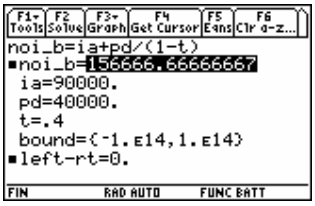
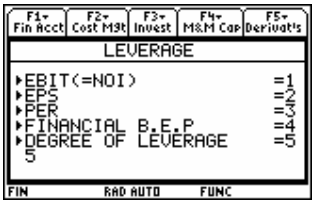
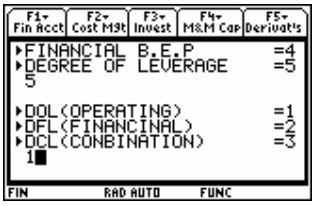
pd : Prefered Dividend

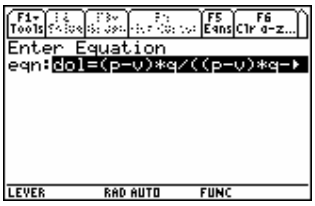
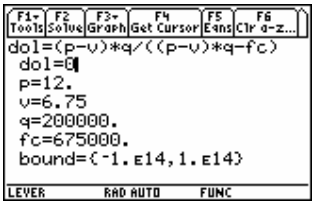
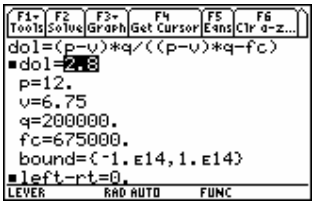
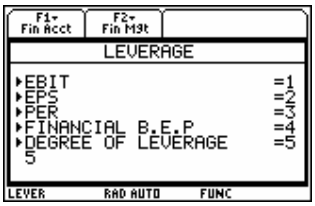
noi: Net Operating Income(=EBIT)

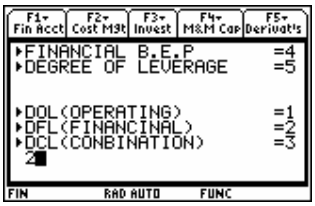
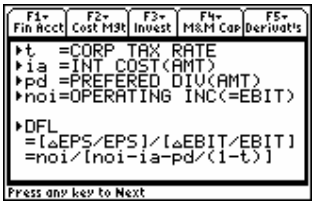
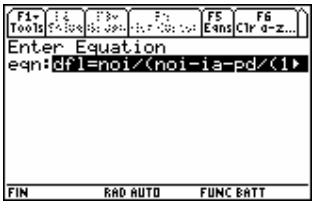
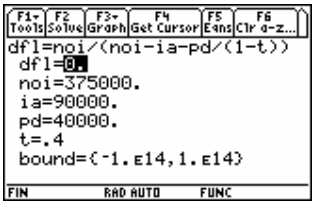
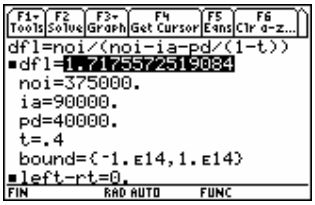
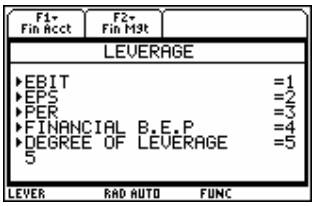


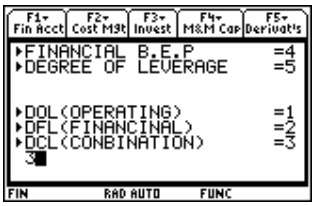
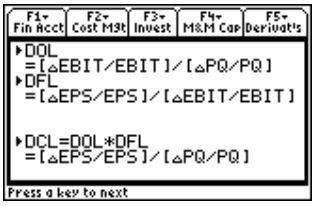
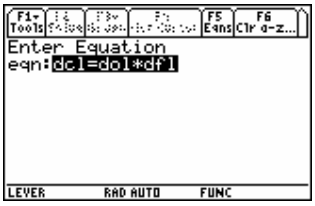
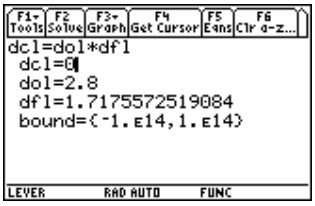
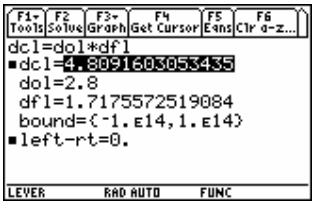
Step	Keystroke	Display
Display of EPS equation. (,)	,	
Display of values entered and computed as below variables in previous process. noi : Net Operating Income(=EBIT)		
Input value as below variables. ia : 2250000*.4*.1 t : .4 pd : 40000 ns : 50000		
		
Place cursor on ‘eps’ prompt. Press „ to solve EPS ‘eps’.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Leverage.	**2** **O**	
Input ‘3’, if you want to go to “PER” solver mode.	3	
	,	

Step	Keystroke	Display
Display of meaning of variables in solver mode. per : price/earnings ratio sp : stock price eps : Earnings Per Stock		
Display of PER equation. (,)	,	
Display of values entered and computed as below variables in above process. eps : Earnings Per Stock		
Input value as below variables. s : 5.24	5.24 ,	
Place cursor on ‘per’ prompt. Press „ to solve PER ‘per’.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Leverage.	**2** **O**	
Input ‘4’, if you want to go to “FINANCIAL B.E.P” solver mode.	4 ,	

Step	Keystroke	Display
Display of meaning of variables in solver mode. t : Tax Rate ia : Interest Expense pd : Prefered Dividend noi_b : Financial B.E.P		
Display of Financial B.E.P equation. (,)	,	
Display of values entered and computed as below variables in previous process. ia : Interest Expense pd : Prefered Dividend t : Tax Rate		
Place cursor on 'Financial B.E.P' prompt. Press „ to solve Financial B.E.P 'noi_b'.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Leverage.	**2** **O**	
Input '5', if you want to go to "DEGREE OF LEVERAGE".	5 ,	
Input '1', if you want to select "DOL" solver mode.	1 ,	

Step	Keystroke	Display
Display of meaning of variables in solver mode. p : Sale Price v : Variable Cost per unit q : Sale Quantity fc : Fixed Cost DOL : Degree of Operating Leverage		
Display of DOL equation. (,)	,	
Display of values entered and computed as below variables in previous process. p : Sale Price v : Variable Cost per unit q : Sale Quantity fc : Fixed Cost		
Place cursor on ‘dol’ prompt. Press „ to solve Degree of Operating Leverage ‘dol’.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Leverage.	**2** **O**	
Input ‘5’, if you want to go to “DEGREE OF LEVERAGE”.	5 ,	

Step	Keystroke	Display
Input '2', if you want to selerct "DFL" solver mode.	2 ¸	
Display of meaning of variables in solver mode. t : Tax Rate ia : Interest Expense pd : Prefered Dividend noi: Net Operating Income(=EBIT) DFL : Degree of Financial Leverage		
Display of DFL equation. (¸)	¸	
Display of values entered and computed as below variables in above process. noi: Net Operating Income(=EBIT) ia: Interest Expense pd : Prefered Dividend t : Tax Rate		
Place cursor on 'dfl' prompt. Press „ to solve Degree of Financial Leverage 'dfl'.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in Leverage.	**2** **O**	
Input '5', if you want to go to "DEGREE OF LEVERAGE".	5 ¸	

Step	Keystroke	Display
Input '3', if you want to selerct "DCL" solver mode.	3 ,	
Display of meaning of variables in solver mode. DOL : Degree of Operating Leverage DFL : Degree of Financial Leverage DCL : Degree of Conbining Leverage		
Display of DCL equation. (,)	,	
Display of values entered and computed as below variables in above process. dol : Degree of Operating Leverage dfl : Degree of Financial Leverage		
Place cursor on 'dcl' prompt. Press „ to solve Degree of Conbining Leverage 'dcl'.	„	

Example 4.2 : M&M Cap

M&M Cap menu is used to analyze Modigliani & Miller proposition

- Display the variables and formula using M&M proposition.
- Calculate the cost of debt using the CAPM.
- Calculate the cost of equity using the M&M Proposition II.
- Calculate the weighted average cost of capital using the M&M Proposition III.
- Calculate the value of levered firm using the M&M Proposition I.
- Calculate the equity value of levered firm using the net income and cost of equity.
- Calculate the weighted average cost of capital using each cost.

Example : Calculating Cost of Debt, Cost of Equity, Weighted Average Cost of Capital, Value of Firm, Value of Equity

[Refer to example 3.2.]

Consider the following information on the returns on the market and CLO company.

State	Probability	Market Return R_m	Return for the Firm R_j
1	.1	-.15%	-.30
2	.3	.05	.00
3	.4	.15	.20
4	.2	.20	.50

The CLO company has been an all-equity firm until now. The CLO company expects to generate $86,500 in earnings before interest and taxes (NOI). The CLO company is considering its capital restructure. The CLO company will has an debt beta, β_d of 0.5 and 50% debt in its capital structure. The risk-free rate is 6%. and corporate tax rate is 27%.

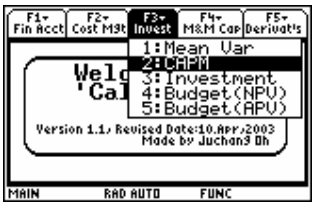
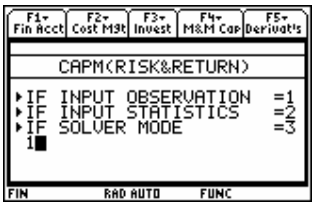
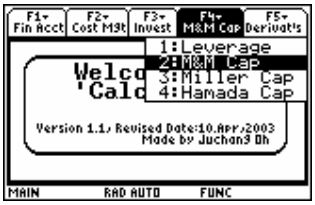
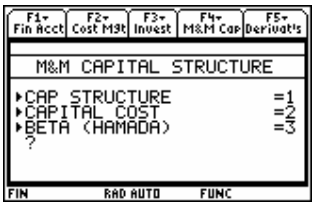
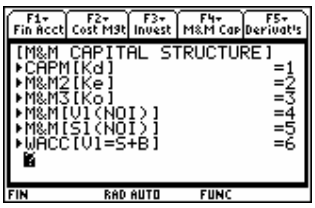
When the CLO company become the levered firm,

a) What is the cost of debt?

b) What is the cost of equity?

c) What is the weighted average cost of capital (WACC)?

d) What is the value of the levered firm?

Step	Keystroke	Display
Select “Invest” category and “CAPM” menu.	… ©	
Exercise the same steps as Example 3.2 (You can see values entered and computed at the same steps as Example xx with only pressing . (, , , , ….. until following step.), if already exercise Example xx.)	, • • • • •	
Select “M&M Cap”(M&M Capital Structure) category and “M&M Cap” menu.	2 ,	
Input ‘1’, if you want to select “CAP STRUCTURE”.	.. ,	
Input ‘1’, if you want to select “CAPM[Kd]”.	1 ,	

Step	Keystroke	Display

Display of meaning of variables in solver mode.

Kd : Capital Cost of Debt

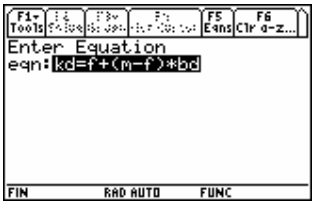
F : Risk Free Interest Rate

M : Market Interest Rate

Bd : Beta of Debt

Display of CAPM[Kd] equation. ,

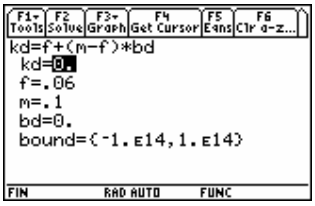
(,)



Display of values entered and computed previously as below variables.

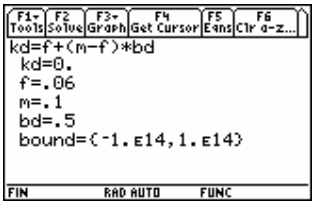
F : Risk Free Interest Rate

M : Market Interest Rate



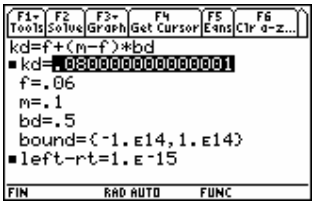
Input beta of debt. 0.1

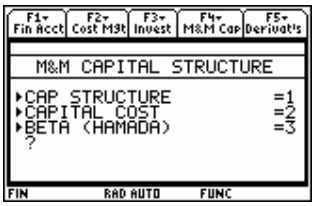
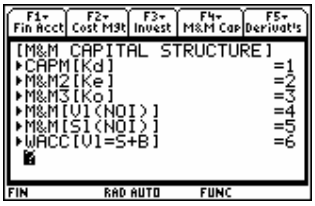
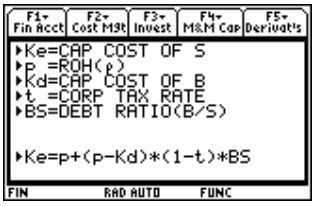
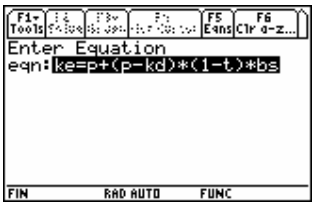
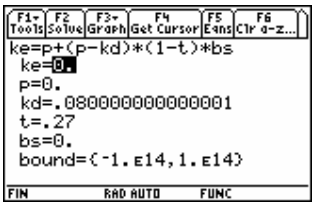
,

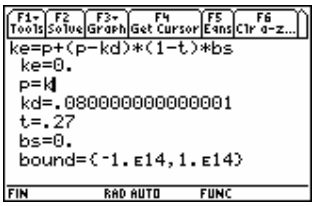
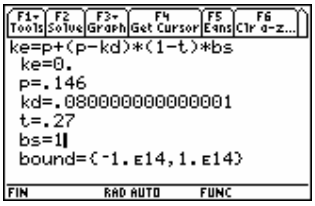
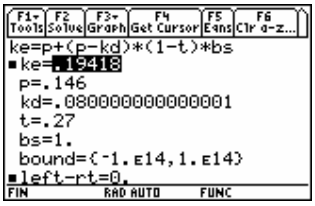
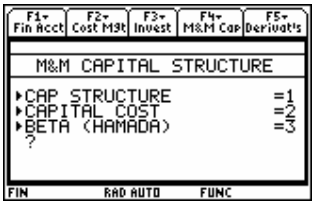
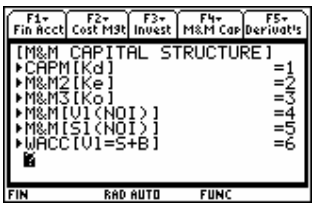


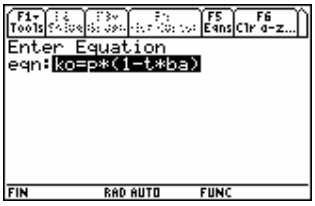
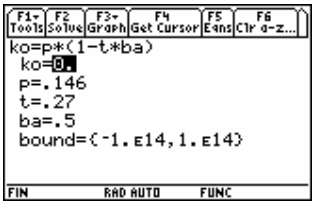
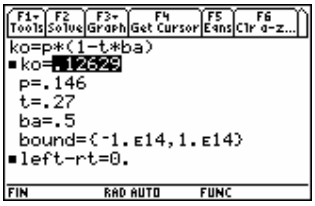
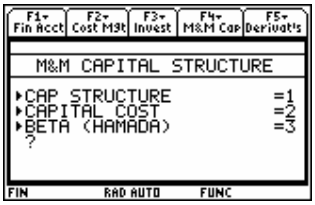
Place cursor on 'kd ' prompt. „

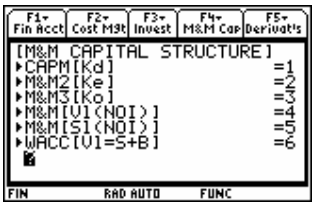
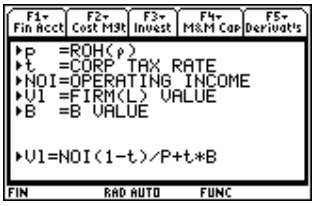
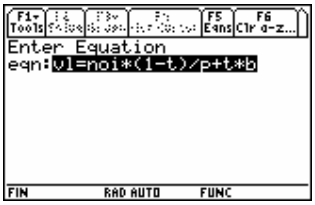
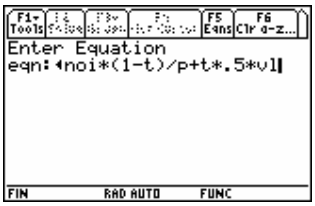
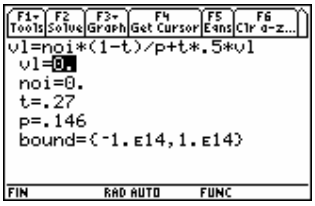
Press „ to solve Capital Cost of Debt 'kd'.

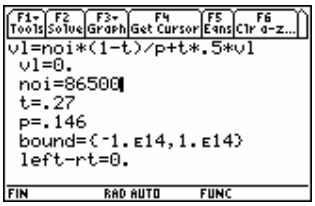
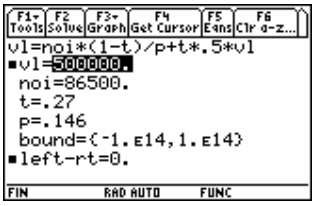
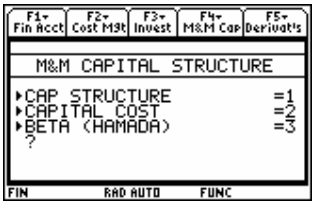
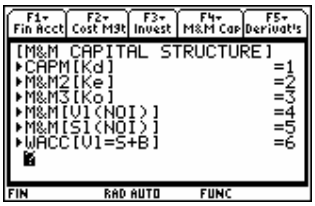
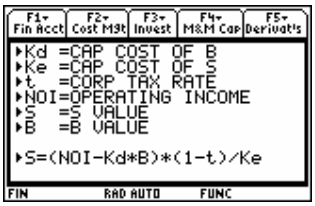


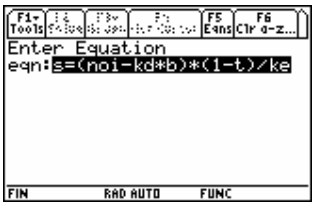
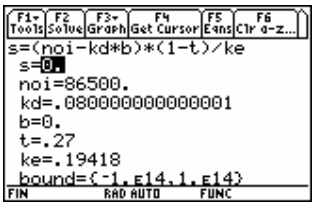
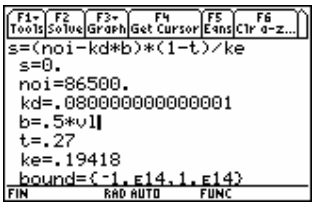
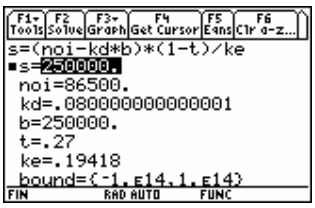
Step	Keystroke	Display
Press **2** + **O** **a** to change solver mode to CalcuFin application and then return first step in M&M Cap.	**2** + **O**	
Enter if you want to select “CAP STRUCTURE”.	,	
Input ‘2’, if you want to select “M&M[Ke]”.	2 ,	
Display of meaning of variables in solver mode. Ke : Capital Cost of Levered Equity(S) p : Roh (Capital Cost of Unlevered Equity) Kd : Capital Cost of Debt t : Corporate tax rate BS : Debt Ratio (Debt / Equity)		
Display of M&M[Ke] equation. (,)	,	
Display of values entered and computed previously as below variables. Kd : Capital Cost of Debt t : Corporate tax rate		

Step	Keystroke	Display
Input Roh (Capital Cost of Unlevered Equity) (Use required return rate, 'K' calculated in CAPM in previous step)	k ¸	
Input debt ratio (Debt / Equity).	1 ¸	
Place cursor on 'ke' prompt. Press „ to solve Capital Cost of Equity 'ke'.	„	
Press **2** + **O** **a** to change solver mode to CalcuFin application and then return first step in M&M Cap. Enter if you want to select "CAP STRUCTURE".	**2** + **O** ¸	
Input '3', if you want to select "M&M[Ko]".	a ¸	

Step	Keystroke	Display
Display of meaning of variables in solver mode. Ko : Weighted Average Cost of Capital (WACC) p : Roh (Capital Cost of Unlevered Equity) t : Corporate tax rate BA : Debt Ratio (Debt / Asset)	© ¸	
Display of M&M[Ko] equation. (¸)	¸	
Display of values entered and computed previously as below variables. p : Roh (Capital Cost of Unlevered Equity) t : Corporate tax rate BA : Debt Ratio (Debt / Asset)		
Place cursor on 'ko' prompt. Press „ to solve WACC, 'ko'.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in M&M Cap.	**2** + **O**	
Enter if you want to select "CAP STRUCTURE".	¸	

Step	Keystroke	Display
Input '4', if you want to select "M&M[Vl(NOI)]".	4 ,	
Display of meaning of variables in solver mode. p : Roh (Capital Cost of Unlevered Equity) t : Corporate tax rate NOI : Operating Income(EBIT) Vl : Value of Firm B : Value of Debt		
Display of M&M[Vl(NOI)] equation. (,)	,	
Modify 'b' into '0.5*vl' through equation editor.	0.5*vl ,	
Display of values entered and computed previously as below variables. t : Corporate tax rate p : Roh (Capital Cost of Unlevered Equity)		

Step	Keystroke	Display
Input operating Income (EBIT).	86500 ¸	
Place cursor on ‘vl’ prompt. Press „ to solve Value of Firm ‘vl’.	„	
Press **2** + **a** to change solver mode to CalcuFin application and then return first step in M&M Cap. Enter if you want to select “CAP STRUCTURE”.	**2** + **O** ¸	
Input ‘5’, if you want to select “M&M[SI(NOI)]”.	5 ¸	
Display of meaning of variables in solver mode. Kd : Capital Cost of Debt Ke : Capital Cost of Equity t : Corporate tax rate NOI : Operating Income(EBIT) S : Value of Equity B : Value of Debt		

Step	Keystroke	Display
Display of M&M[SI(NOI)] equation. (,)	,	
Display of values entered and computed previously as below variables. noi : Operating Income(EBIT) kd : Capital Cost of Debt t : Corporate tax rate ke : Capital Cost of Equity		
Input value of debt (0.5*vl). (Use value of firm, 'vl' calculated in previous step.)	0.5*vl ,	
Place cursor on 's' prompt. Press „ to solve Value of Equity, 's'.	„	

Example 4.3 : Miller Cap

Miller Cap menu is used to analyze the capital structure under personal and corporate taxes.

- Display the variables and formula using M&M proposition.
- Calculate the cost of equity under personal and corporate taxes.
- Calculate the weighted average cost of capital under personal and corporate taxes.
- Calculate the value of unlevered firm under personal and corporate taxes.
- Calculate the value of levered firm under personal and corporate taxes.
- Calculate the equity value of levered firm under personal and corporate taxes.

Example 4.4 : Hamada Cap

Hamada Cap menu is used to analyze Hamada model.

- Calculate the beta of equity (B_{SL}, B_{SU}) using the Hamada model.
- Calculate the capital cost of unlevered firm using the Hamada model and B_{SU}.
- Calculate the beta of asset (B_A) using the Hamada model and B_S, B_B.
- Calculate the capital cost of unlevered firm using the CAPM model and B_{SU}.
- Calculate the weighted average cost of capital using the CAPM model, the Hamada model and B_{SU}, B_B.
- Calculate the weighted average cost of capital using the CAPM model, the Hamada model and B_S, B_B.

Examples of Derivatives and Other topics

7

Example 5.1 : Binom OPM

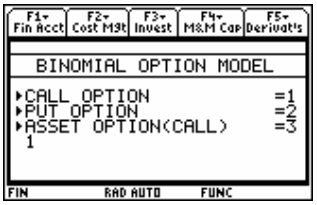
Binom OPM menu is used to analyze the call and put option using the binomial model for pricing option on stocks. Once you've entered the option terms and the data required by the binomial model, you can:

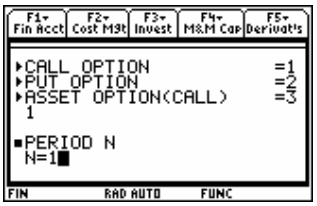
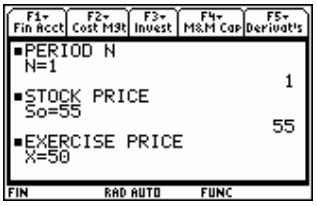
- Calculate the hedge ratio.
- Calculate the hedge probability.
- Calculate the option equilibrium price

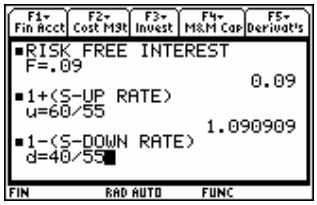
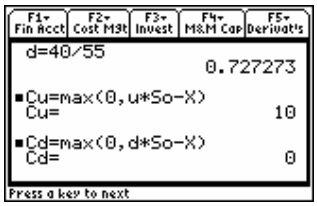
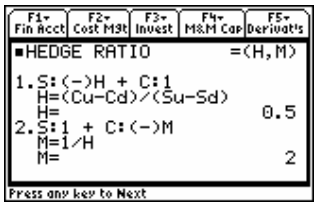
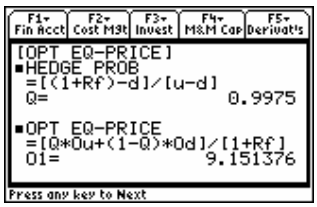
Example: Call and Put Price under Binomial Option Price Model (One period)

Assuming only two states will exist one year from today when a call and put on Delta Inc., stock expires. The price of Delta stock will be either $60 or $40 on that date. Today, Delta stock trades for $55. The rate at which you can borrow is 9%.

[Part 1] The strike price of the call is $50. How much are you willing to pay for a contract of this call?

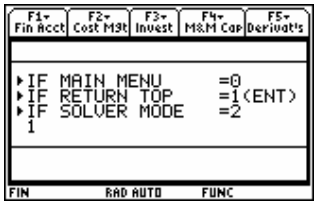
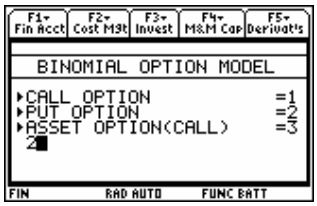
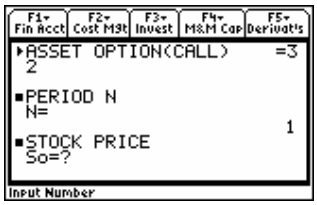
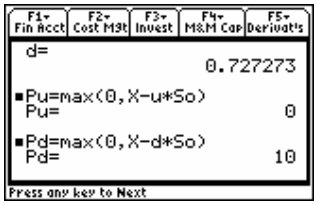
Step	Keystroke	Display
Select “Derivat’s”(Derivatives and Other Topics) category and “Binom OPM” menu.	„ 1	
Select the field to work. Input 1 if call option.	1 ,	

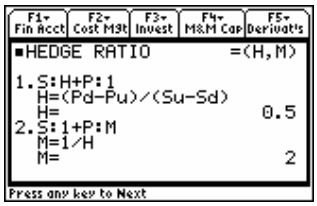
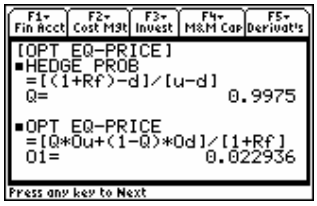
Step	Keystroke	Display
Input maturity period of option.	1 ➘	
Input stock price.	55 ➘	
Input exercise price	50 ➘	
Input risk free interest rate.	0.09 ➘	
Input multiplicative upward rate in the stock price.	60/55 ➘	

Step	Keystroke	Display
Input multiplicative downward rate in the stock price.	40/55 ,	
Display of calculated value of option when stock price up to $60. Display of calculated value of option when stock price down to $40. (Press any key to next step.)		
Display of stock hedge ratio for one call option buy. Display of call option hedge ratio for one stock buy. (Press any key to next step.)		
Display of calculated hedge probability Display of calculated option equilibrium price (Press any key to next step.)		

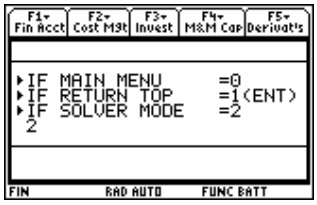
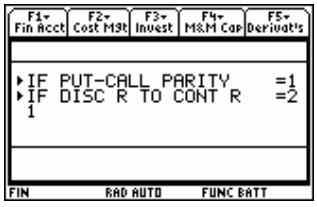
[Part 2] The strike price of the put is $50. How much are you willing to pay for a contract of this put?

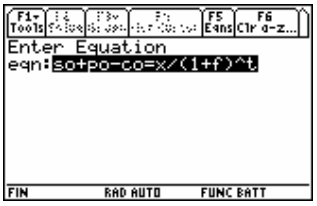
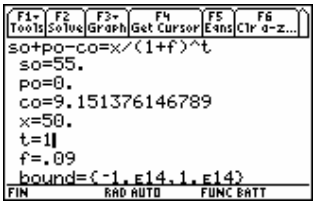
[Method 1]

Step	Keystroke	Display
Press , if you want to return to first step again.		
Select the field to work. Input 2 if put option.	2	
You can see values entered and computed at the same steps as previous with only pressing since the same value as previous is stored. (, , , , …until following step.)		
		
Display of calculated value of option when stock price up to $60. Display of calculated value of option when stock price down to $40. (Press any key to next step.)		

Step	Keystroke	Display
Display of stock hedge ratio for one put option buy. Display of put option hedge ratio for one stock buy. (Press any key to next step.)		
Display of calculated hedge probability. Display of calculated option equilibrium price.		

[Method 2]

Step	Keystroke	Display
Select solver mode.	2 ,	
Select put-call parity.	1 ,	

Step	Keystroke	Display
Display of meaning of variables in solver mode. (Press any key to next step.)		
Display of current solver equation.	,	
		
Input time to expiration date (t).	1 ,	
Place cursor on ‘po’ prompt. Press „ to solve put price ‘po’.(0.22935)	„	

Example 5.2 : B&S OPM

B&S OPM menu is used to analyze the call and put option using the Black-Sholes model and the put-call parity for pricing option on stocks.

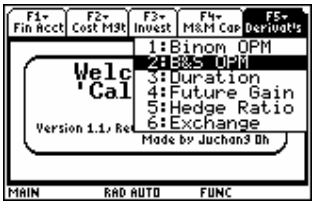
- Calculate the parameters (d1, d2) on the Black-Sholes model.
- Calculate the accumulative normal distributions of (d1, d2) on the Black-Sholes model.
- Calculate the option equilibrium price.
- Calculate the hedge ratio.

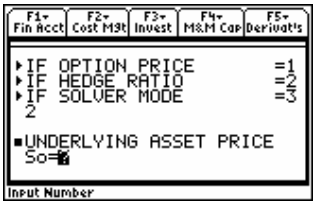
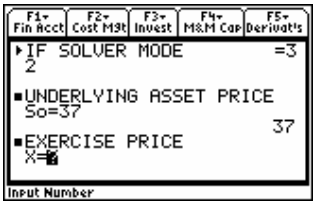
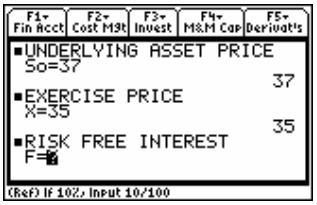
Example: Pricing Call and Put on the Black-Sholes model

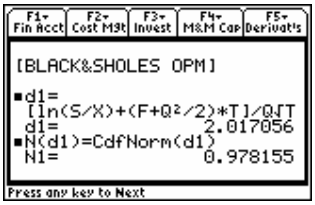
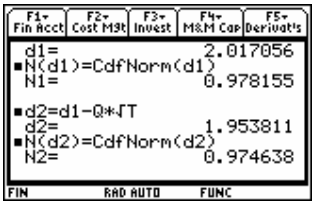
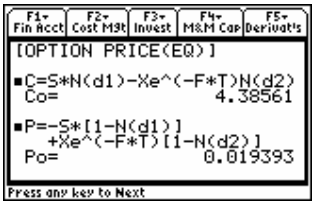
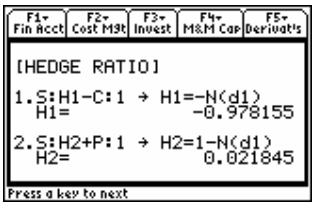
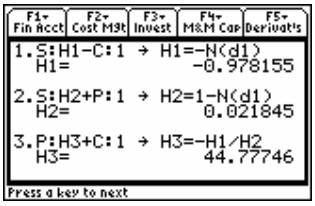
[Part 1]

Calculate a call and put option on CLO Company stock. The option will expire one year from today and the exercise price is $35. The risk free rate is 7%. CLO stock is selling for $37 per share and your estimate of variance of the return on the stock is 0.004.

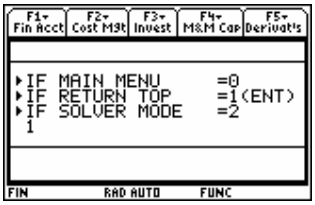
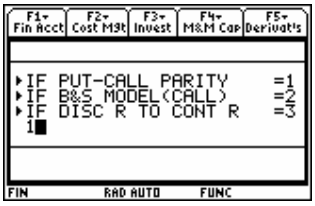
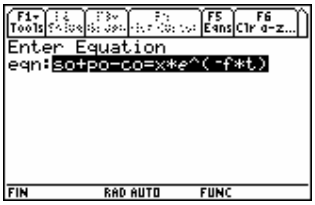
a) Use the Black-Sholes model to price the call and put.
b) How many CLO stock will you sell for buying one call in order to make the hedge portfolio?
c) How many CLO stock will you buy for buying one put in order to make the hedge portfolio?
d) How many put will you buy for buying one call in order to make the hedge portfolio?

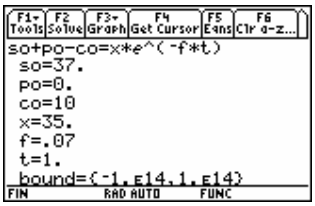
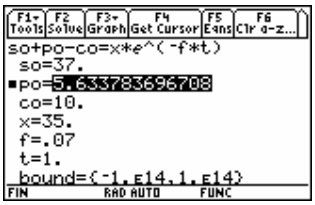
Step	Keystroke	Display
Select “Derivat’s”(Derivatives and Other Topics)	‡	
category and “B&S OPM” menu.	2	

Step	Keystroke	Display
Input ‘2’ if calculate option price and hedge ratio.	2 ›	
Input current stock price.	37 ›	
Input exercise price.	35 ›	
Input risk free interest rate.	0.07 ›	
Input time in years to expiration date.	1 ›	

Step	Keystroke	Display
Input standard deviation of return on stock.	0.004 **Z** 0.5 ¸	
Display of calculated parameter and cumulative normal distribution of d1 on the BS model. (Press any key to next step.)		
Display of calculated parameter and cumulative normal distribution of d2 on the BS model. (Press any key to next step.)		
Display of call option equilibrium price. Display of put option equilibrium price. (Press any key to next step.)		
Display of stock hedge ratio for one call option buy. Display of stock hedge ratio for one put option buy. Display of put option hedge ratio for one call option buy. (Press any key to next step.)		 

[Part 2] : Consider a call option on CLO Company stock. The option will expire one year from today and the exercise price is $35. The risk free rate is 7%. CLO stock is selling for $37 per share. What does put-call parity imply the price of the corresponding put will be if the call is selling for $ 10?

Step	Keystroke	Display
Press , , if you want to return to first step again.	,	
Select solver mode.	3 ,	
Select put-call parity.	1 ,	
Display of meaning of variables in solver mode. (Press any key to next step.)		
Display of current solver equation. (Press any key to next step.)		

Step	Keystroke	Display
Input variables as follows. so : Underlying asset price (37 + ,) c o: Call price (10 + ,) x : Exercise price (35 + ,) f : Risk free interest rate (0.07 + ,) t : Time to expiration date (1 + ,)		
Place cursor on 'po' prompt. Press „ to solve put price 'po'.(5.63378)	„	

Example 5.3 : Duration

DURATION menu is used to analyze the duration of a bond. Once you've entered the bond data, you can:

- Calculate the duration of term bonds and calculate the bond convexity.
- Calculate the elasticity of bond price for interest rate using the duration.
- Calculate the change of bond price for interest rate using the duration.
- Calculate the change of bond price for interest rate using the convexity.

Example: Duration and Convexity of a Term Bond

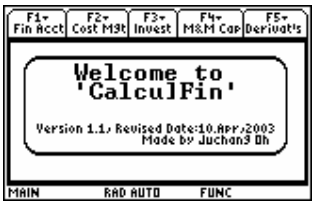
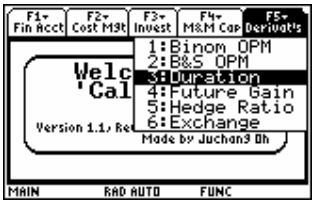
[Part 1] [Refer to example 1.1. Coupon Bond]

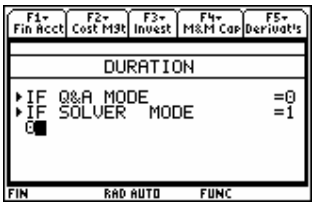
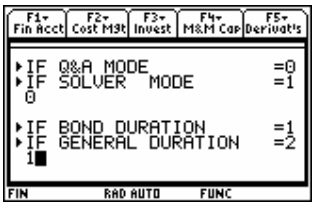
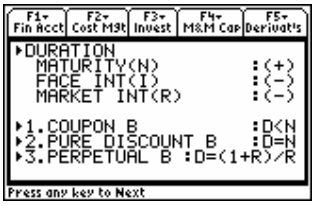
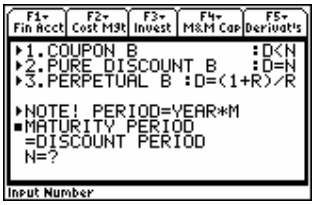
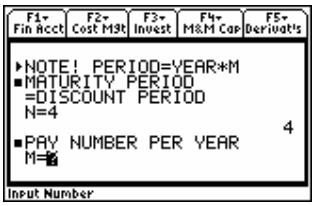
On September 30, 2001, you issue $30,000 of 8%, 2-year bonds payable. The bonds pay interest on March 31 and September 30. The market interest rate is 7%.

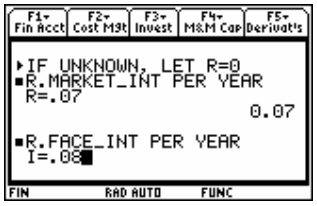
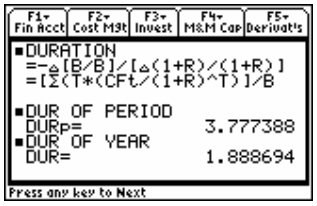
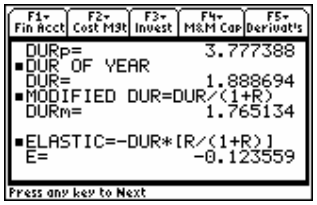
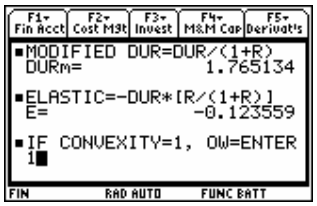
a) Calculate the duration and convexity of the bond

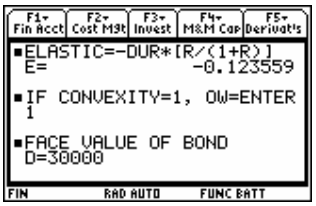
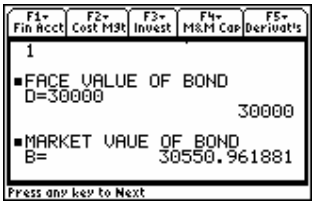
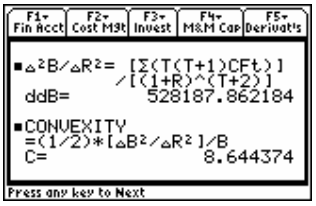
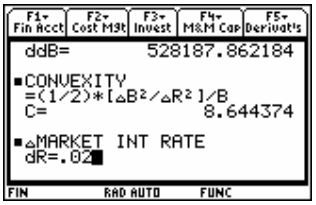
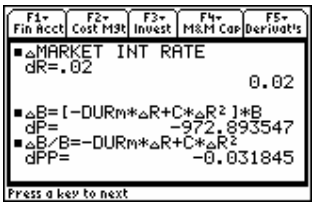
b) If the market rate of interest rises to 9%, what will be the price of this bond using the duration?

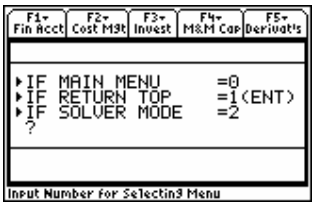
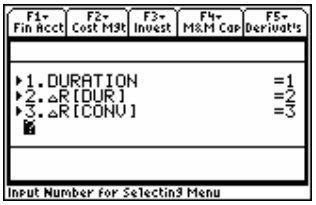
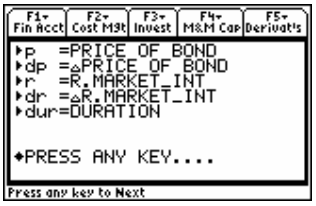
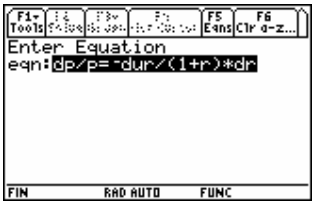
c) If the market rate of interest rises to 9%, what will be the price of this bond using the convexity?

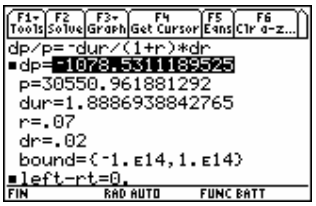
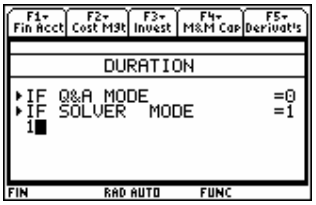
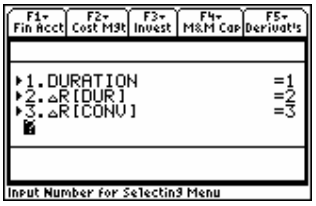
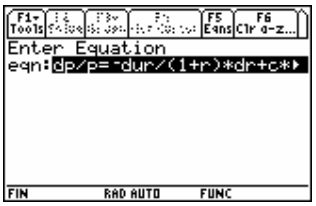
Step	Keystroke	Display
Initial screen of application. (**O** Select “FlashApps” + ¸ Select “CalcuFin” + ¸)		
Select “Derivat’s”(Derivatives and Other Topics) category and “Duration” menu.	‡ a	

Step	Keystroke	Display
Select Q&A mode.	µ ,	
Select bond duration mode.	¨ ,	
Display of relation of duration. (Press any key to next step.)	,	
You can see entered and computed values in Example 1.1 with only pressing , . (, , , , , ...), if already exercise Example 1.1.		
Input total number of payment.	4 ,	
Input number of payments per year.	2 ,	

Step	Keystroke	Display
Input effective interest rate per year.	0.07 ,	
Input face interest rate.	0.08 ,	
Display of calculated duration by the payment period and calculated duration by the year. (Press any key to next step.)	,	
Display of calculated modified duration by the year. Display of calculated price elasticity of interest. (Press any key to next step.)	,	
Select convexity mode.	¨ ,	

Step	Keystroke	Display
Input face value of bond.	30000 ↵	
Display of calculated market value. (Press any key to next step.)		
Display of calculated d^2B/dR^2. Display of calculated convexity. (Press any key to next step.)		
Input increase of interest rate.	0.02 ↵	
Display of calculated increase of price. Display of calculated increase rate of price. (Press any key to next step.)		

Step	Keystroke	Display
Select solver mode	© ¸	
Input 2 if calculate increase of price by duration.	© ¸	
Display of meaning of variables in solver mode. (Press any key to next step.)		
Display of current equation.	¸	
Display of values entered and computed as below variables in above steps. p : Price of Bond dur : Duration of Bond r : Effective Interest Rate dr : Increase of Effective Interest Rate		

Step	Keystroke	Display
Place cursor on ‘dp’ prompt. Press „ to solve increase of price of bond ‘dp’.	„	
Press **2** + **O** **a** to change solver mode to CalcuFin application. Select solver mode	**2** + **O** ¸ ¸	
Input 3 if calculate increase of price by convexity.	a ¸	
Display of meaning of variables in solver mode. (Press any key to next step.)		
Display of current equation.	¸	

Step	Keystroke	Display
Display of values entered and computed as below variables in above steps. p : Price of Bond r : Effective Interest Rate dr : Increase of Effective Interest Rate dur : Duration of Bond c: Convexity of Bond		
Place cursor on ‘p’ prompt. Press „ to solve increase of price of bond ‘dp’.	„	

[Part2]

An asset has following cash flows over the next five years as illustrated in figure 2.

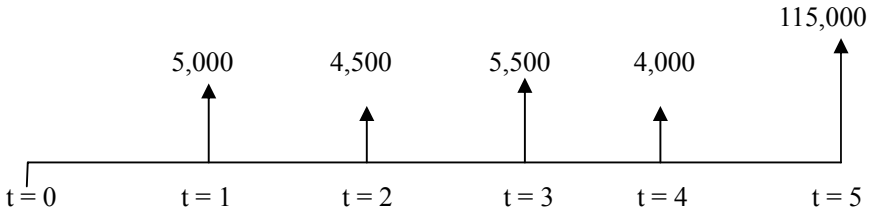
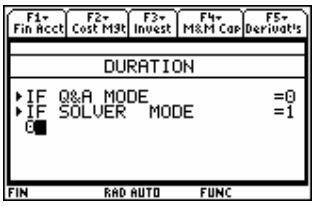
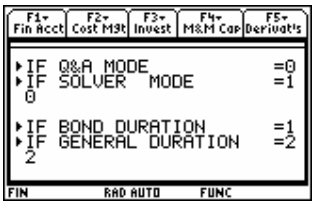
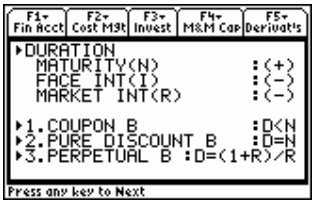
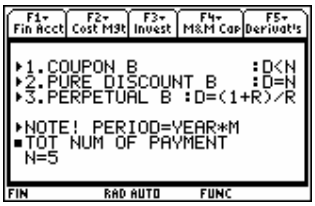
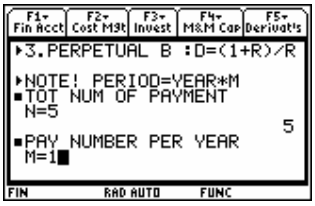
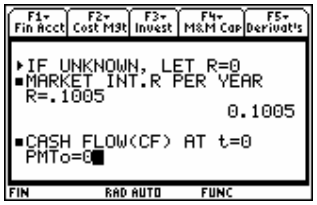
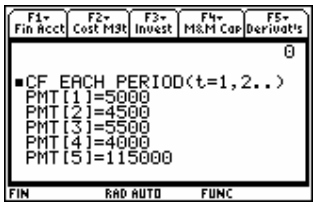
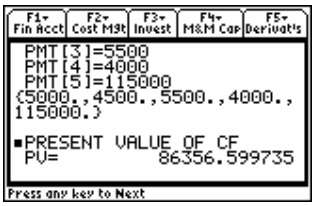
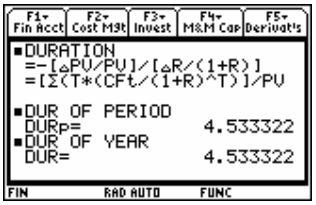
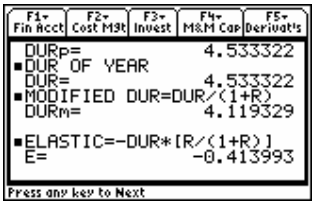
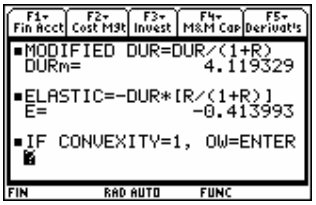
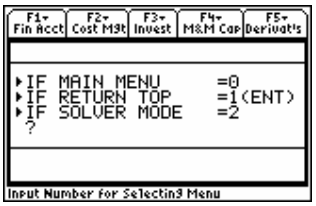


Figure 2. Cash Flows for an Asset

Calculate the duration of the asset assuming an annual interest rate of 10.05%.

Step	Keystroke	Display
Select Q&A mode.	0	
Select general duration mode.	2	
Display of relation of duration. (Press any key to next step.)		

Step	Keystroke	Display
Input total number of payment.	5 ▸	
Input number of payments per year.	1 ▸	
Input effective interest rate per year.	0.1005 ▸	
Input initial cash flows at t=0.	0 ▸	
Input cash flows from t=1 to t=5 as list type.	5000 ▸ 4500 ▸ 5500 ▸ 4000 ▸ 115000 ▸	

Step	Keystroke	Display
Display of net present value of cash flows. (Press any key to next step.)		
Display of calculated duration by the payment period and calculated duration by the year. (Press any key to next step.)		
Display of calculated modified duration by the year. Display of calculated price elasticity of interest. (Press any key to next step.)		
Input ‘1’ if you do not need convexity mode.	1 ↵	
input ‘0’ if go to initial screen.	2 ↵	

Example 5.4 : Future Gain

Future Gain menu is used to analyze the hedge future transaction in the commodity futures, stock index futures and interest rate futures

- Calculate the hedge ratio and number of hedge contracts for commodity futures, stock index futures, interest rate futures.
- Calculate the transaction gain or loss by a hedge future transaction.
- Calculate the net profit and net price by a hedge future transaction.

Example 5.5 : Hedge Ratio

Hedge Ratio menu is used to analyze the commodity futures, stock index futures and interest rate futures.

- Calculate the hedge ratio and number of hedge contracts for commodity futures, stock index futures, interest rate futures.
- Calculate the number of contracts to set the target beta of portfolio for stock index futures.
- Calculate the number of contracts to set the target duration of portfolio for interest rate futures.

Example 5.6 : Exchange

Exchange menu is used to analyze the relationship between the spot exchange rate, futures exchange rate, inflation rate and interest rate.

- Calculate the exchange rate, inflation rate and interest rate by the purchasing power parity.
- Calculate the exchange rate, inflation rate and interest rate by the interest rate parity.
- Calculate the exchange rate, inflation rate and interest rate by the forward parity.

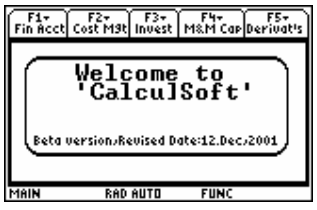
Example: PPPT, IRPT and FPT

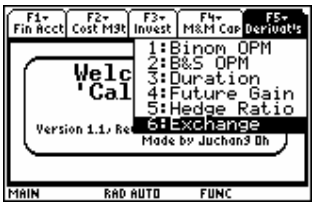
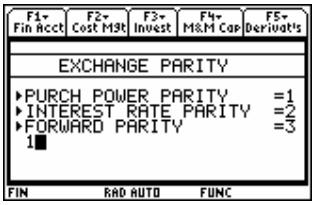
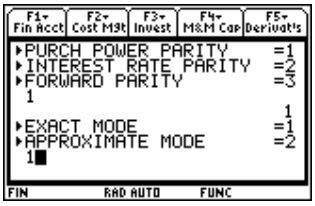
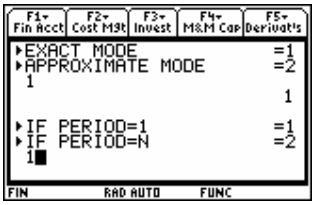
In January 20x0(when DM3 = $1) it was expected that by the end of 20x0 the price level in the United Sates would have risen by 10% and in Germany by 5%. The nominal rate of interest in the United Sates is 14.4%.

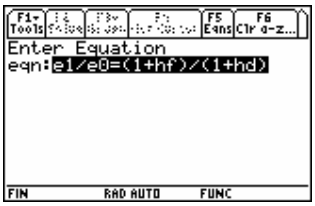
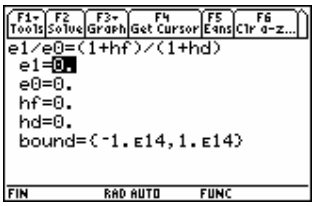
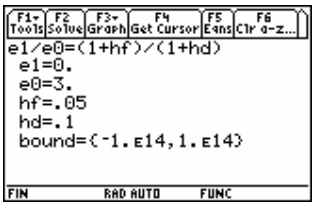
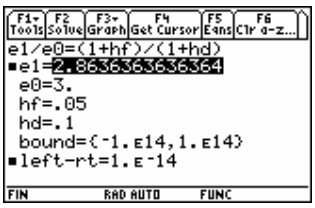
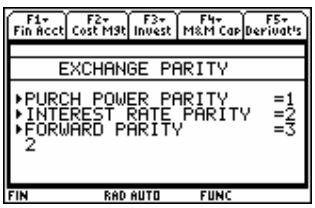
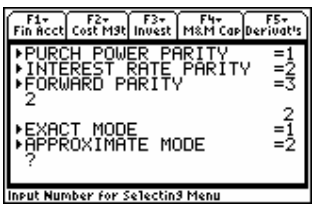
a) Use the PPPT to project the expected DMs per $1 at the end of 20x0 (the expected future spot rate of DMs per $1).

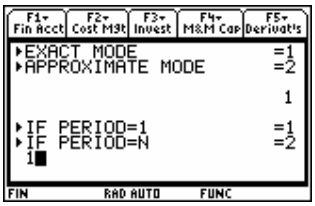
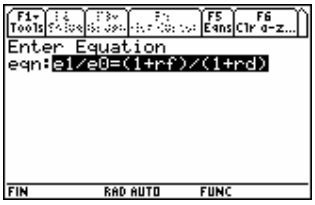
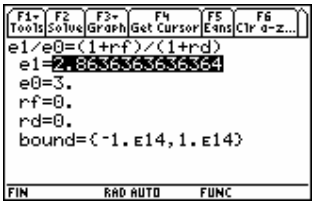
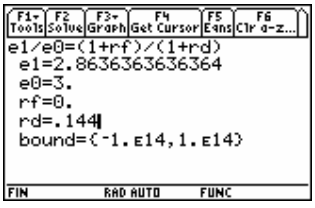
b) Use the IRPT to estimate the nominal interest rates in Germany.

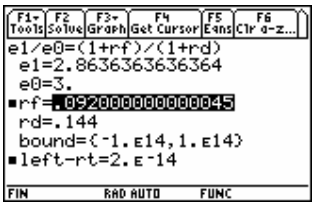
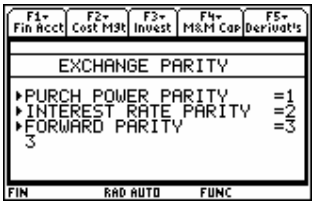
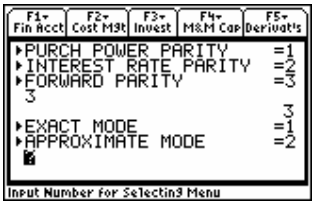
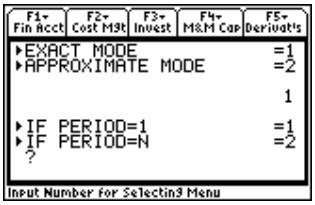
c) Use the FPT to estimate the current one-year forward rate of DMs per 1$.

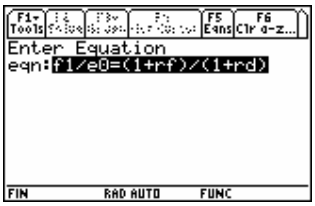
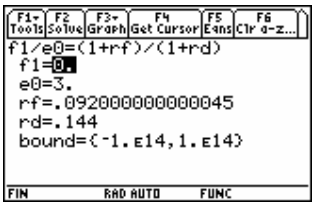
Step	Keystroke	Display
Initial screen of application. (**O** Select “FlashApps” + , Select “CalcuFin” + ,)		

Step	Keystroke	Display
Select “Derivat’s”(Derivatives and Other Topics) category and “Exchange” menu.	‡ {	
Select purchase power parity.	1 ¸	
Select exact mode.	1 ¸	
Input 1 if one period model.	1 ¸	
Display of meaning of variables in solver mode. E0 : Exchange rate now E1 : Exchange rate one period later Hf : Foreign country inflation rate Hd : domestic Inflation rate (Press any key to next step.)		

Step	Keystroke	Display
Display of PPPT(Purchasing Power Parity Theorem) equation.	¸	
Display of values entered and computed previously as below variables.		
Input variables in solver mode. e0 : Exchange rate now (3) hf : Foreign country inflation rate (0.05) hd : domestic Inflation rate (0.1)	3 ¸ .05 ¸ .1 ¸	
Place cursor on ‘e1 ’ prompt. Press „ to solve Exchange rate one period later ‘e1’.	„	
Press **2** + **O** **a** to change list mode to CalcuFin application.	**2** + **a**	
Select Interest rate parity.	2 ¸	
Press ¸ if input the same value as previous.	¸	

Step	Keystroke	Display
Press , if input the same value as previous.	,	
Display of meaning of variables in solver mode. E0 : Exchange rate now E1 : Exchange rate one period later Rf : Foreign country interesti rate Rd : domestic Interest rate (Press any key to next step.)		
Display of IRPT(Interest Rate Parity Theorem) equation. (,)	,	
Display of values entered and computed previously as below variables. e1 : Exchange rate one period later (2.863..) e0 : Exchange rate now (3)		
Input values of variables in solver mode. rd : domestic Interest rate (0.144)	.144 ,	

Step	Keystroke	Display
Place cursor on ‘rf ’ prompt. Press „ to solve Foreign country interesti rate ‘rf’.	„	
Press **2** + **O** **a** to change list mode to CalcuFin application. Select forward parity.	**2** + **a** 3 ¸	
Press ¸ if input the same value as previous.	¸	
Press ¸ if input the same value as previous.	¸	
Display of meaning of variables in solver mode. E0 : Exchange rate now F1 : Forward exchange rate Rf : Foreign country interesti rate Rd : domestic Interest rate (Press any key to next step.)		

Step	Keystroke	Display
Display of FPT(Forward Parity Theorem) equation.	,	
Display of values entered and computed previously as below variables. e0 : Exchange rate now (3) rf : Foreign country interesti rate (0.092..) rd : domestic Interest rate (0.144)		
Place cursor on ‘f1’ prompt. Press „ to solve Forward exchange rate ‘f1’.	„