

Amortization Tables

Amortization is paying back a debt at regular time intervals with equal payments.

A table which indicates principal payments, interest payments, and the balance on a loan for each time interval is called the amortization table.

Objectives:

- Determine the monthly payment for a home loan.
- Create an amortization table for a loan.

Calculator Housekeeping Detail

When the **TVM Solver** is used, a number of financial variables are set and available for use in other financial calculations. The functions $\Sigma\text{Int}(A,B)$, $\Sigma\text{Prn}(C,D)$, and $\text{bal}(X)$ use the stored values PV, I%, and PMT from the TVM Solver.

$\Sigma\text{Int}(A,B)$ calculates the sum of the interest from period A through period B. For example, $\Sigma\text{Int}(1,12)$ calculates the sum of the interest for the months 1 through 12.

$\Sigma\text{Int}(2,2)$ would be the interest for the second period.

Other functions which operate in a similar manner include $\Sigma\text{Prn}(C,D)$ and $\text{bal}(X)$. $\Sigma\text{Prn}(C,D)$ computes the sum of the principal from period C through period D. The command $\text{bal}(X)$ computes the balance for the amortization table for period X.

Constructing an Amortization Table

Example 1:

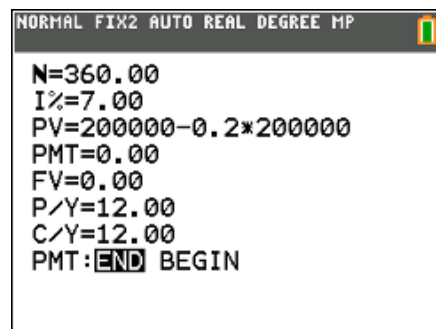
You purchase a condominium for \$200,000, pay 20% down, and mortgage the balance. You amortize your debt with monthly payments for 30 years. What is your monthly payment if your interest rate for the loan is 7% compounded monthly? Create an amortization table for this particular example.

Method 1: Using TABLES

1. Press **apps** and select **Finance**. Press **enter** to select **TVM Solver** from the CALC menu.

Note: The mode DECIMAL SETTING was changed to **FIX2** to round computations to two decimal places.

2. Enter the values as shown. For PV, enter 200000 **[-]** 0.2 **[x]** 200000. This represents the amount of the loan, \$200,000, minus the 20% down payment.



3. Move the cursor to PMT, and press α [solve].

The monthly payment is \$1,064.48

NORMAL FIX2 AUTO REAL DEGREE MP	
N=	360.00
I%=	7.00
PV=	160000.00
PMT=	-1064.48
FV=	0.00
P/Y=	12.00
C/Y=	12.00
PMT:	END BEGIN

Calculator Housekeeping Detail

Use of the **TVM Solver** has set variables that can be used by functions such as **bal(X)**, **Σ Int(A,B)**, and **Σ Prn(C,D)**.

Use the **bal(** command to find the balance after payments 1, 2, and 3.

- Press 2^{nd} [quit] to return to the home screen.
- Press α [apps], select **Finance**, and choose **bal(** from the CALC menu. This will paste the **bal(** command on the home screen.
- Enter 1, and press α [enter] to find the balance after payment 1.
- Arrow up to highlight the balance command. Press α [enter] to paste the command to the entry line. Change the payment number to 2, and press α [enter].
- Repeat Step 7 to edit the payment number and compute the balance after payment 3.

NORMAL FIX2 AUTO REAL DEGREE MP	
CALC VARS	
1:	TVM Solver...
2:	tvm_Pmt
3:	tvm_I%
4:	tvm_PV
5:	tvm_N
6:	tvm_FV
7:	npv(
8:	irr(
9:	bal(

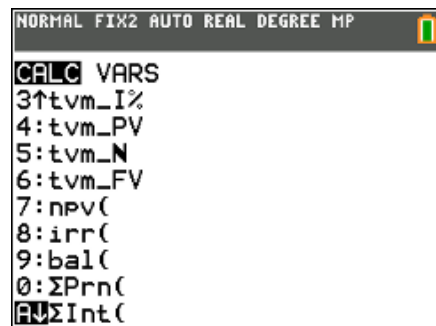
NORMAL FIX2 AUTO REAL DEGREE MP	
bal(1)	159868.85
bal(2)	159736.94
bal(3)	159604.26

Creating the Tables

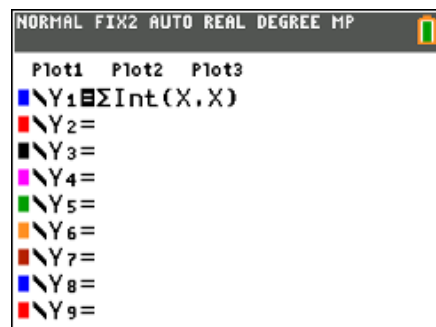
9. To create the tables, press the $y=$ key. Use the α [clear] key to remove any functions left from another problem.

NORMAL FIX2 AUTO REAL DEGREE MP	
Plot1	Plot2 Plot3
\square Y ₁ =	
\square Y ₂ =	
\square Y ₃ =	
\square Y ₄ =	
\square Y ₅ =	
\square Y ₆ =	
\square Y ₇ =	
\square Y ₈ =	
\square Y ₉ =	

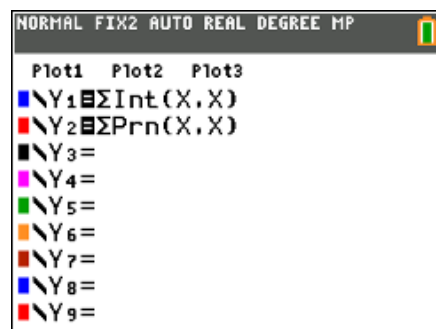
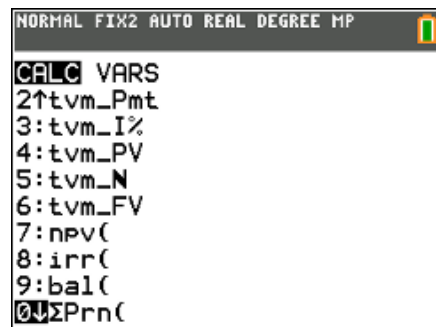
10. Press **apps**, select **Finance**, and choose **ΣInt(** to paste the interest function in Y1.



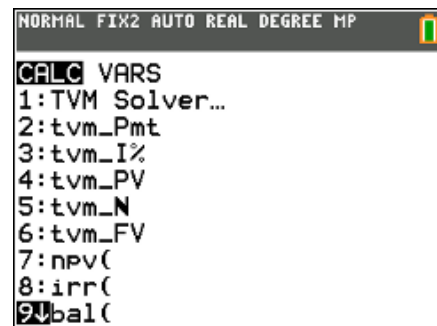
11. Enter **X,T,θ,n** , **X,T,θ,n**) **enter** to complete the function.



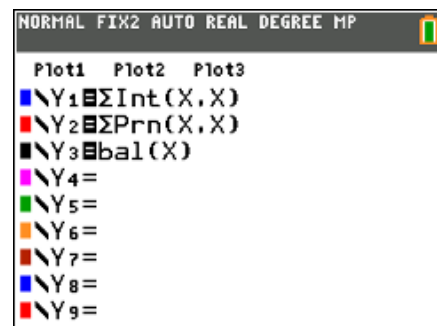
12. Store the principal balances in Y2. Move the cursor to Y2. Press **apps**, select **Finance**, and choose **ΣPrn(** from the CALC menu. Complete the command as in Step 9 above.



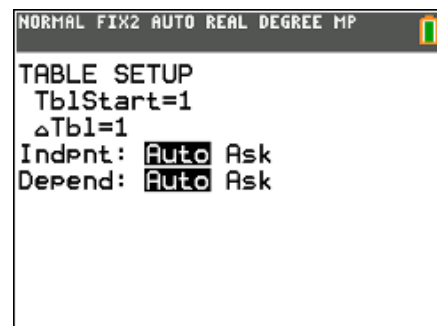
13. Store the balance in **Y3**. Move the cursor to **Y3**. Press **[apps]**, select **Finance**, and choose **bal(** from the CALC menu. Press **[X,T,θ,n]** **[)]** **[enter]** to complete the function.



14. Before viewing the table, set the start value and the increment by pressing **[2nd]** **[tblset]**. Set **TblStart** to 1 and **ΔTbl** to 1.



15. Press **[2nd]** **[table]** to view the table.



16. Press the down arrow key to see values for the different months in the payment schedule.

NORMAL FIX2 AUTO REAL DEGREE MP				
PRESS + FOR ΔTbl				
X	Y1	Y2	Y3	
1.00	-933.3	-131.2	159869	
2.00	-932.6	-131.9	159737	
3.00	-931.8	-132.7	159604	
4.00	-931.0	-133.5	159471	
5.00	-930.3	-134.2	159337	
6.00	-929.5	-135.0	159202	
7.00	-928.7	-135.8	159066	
8.00	-927.9	-136.6	158929	
9.00	-927.1	-137.4	158792	
10.00	-926.3	-138.2	158654	
11.00	-925.5	-139.0	158515	
X=1				

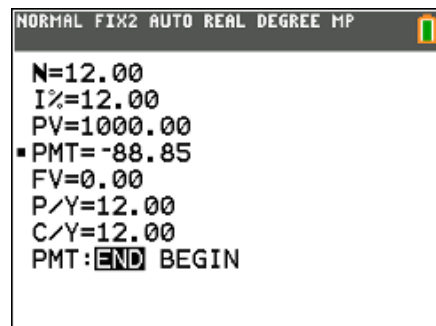
Example 2:

Find the payment needed each month for 1 year to pay off a debt of \$1,000 at 12% compounded monthly. Show the amortization schedule.

Method 2: Using LISTS

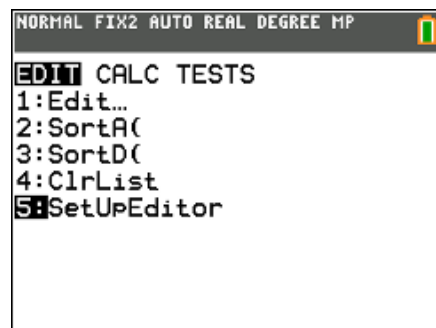
1. Press **[apps]** and select **Finance**. Use the **TVM Solver** as in Method 1 to set the variables for later use in the lists.

The payment per month is \$88.85.



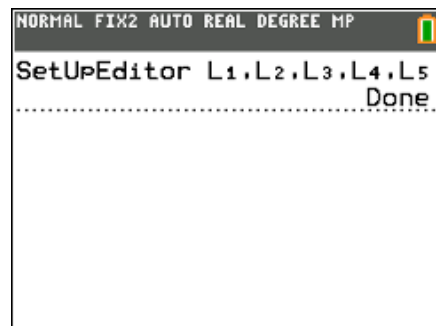
2. To go to the home screen, press **[2nd]** **[quit]**.
3. Press the **[stat]** key and choose **SetUpEditor** from the EDIT menu.

This will paste SetUpEditor on the home screen.



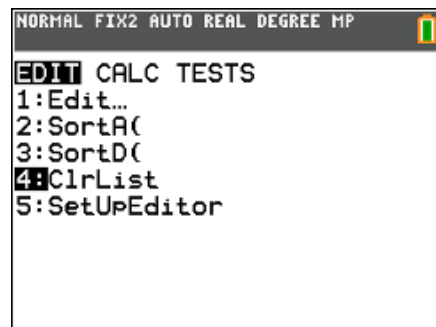
4. Enter **[2nd]** **[L1]** **[,]** **[2nd]** **[L2]** **[,]** **[2nd]** **[L3]** **[,]** **[2nd]** **[L4]** **[,]** **[2nd]** **[L5]** **[enter]**.

The calculator will respond **Done**.



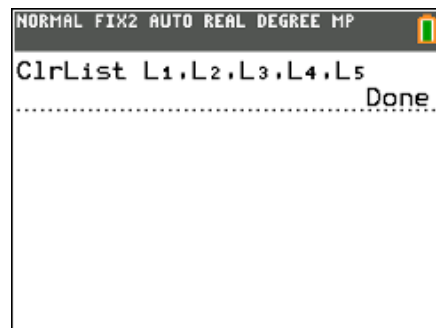
5. Press the **[stat]** key and choose **ClrList** from the EDIT menu.

This will paste the **ClrList** command on the home screen.

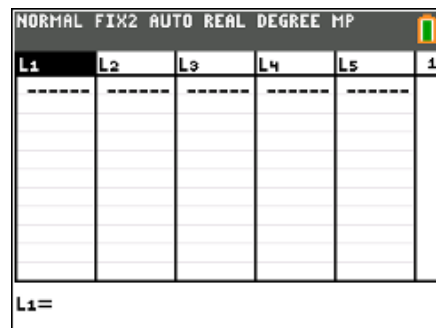


6. Enter $\boxed{2nd} \boxed{[L1]} \boxed{,} \boxed{2nd} \boxed{[L2]} \boxed{,} \boxed{2nd} \boxed{[L3]} \boxed{,} \boxed{2nd} \boxed{[L4]} \boxed{,} \boxed{2nd} \boxed{[L5]}$
 \boxed{enter} .

The calculator will respond **Done**.

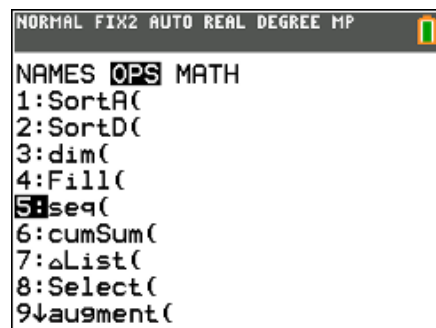


7. Press the \boxed{stat} key and choose **Edit** from the EDIT menu.
8. When the lists appear, move the cursor to the top of the column so that L1 is highlighted and press \boxed{enter} .



9. Enter **seq(A,A,1,12)** for L1.

To access the **seq**(command, press $\boxed{2nd} \boxed{[list]}$, and arrow to the OPS menu. Select **seq**(.



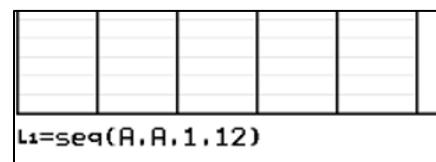
The syntax for the **seq**(command is shown. The default step value is 1.

Enter the expression, variable, start value, and end value. Arrow to **Paste**, and press \boxed{enter} .



The sequence command will be displayed to the right of L1=.

Press \boxed{enter} to enter the values in L1.



10. Highlight L2 and press **[enter]**.

Enter **seq(bal(B),B,1,12)** in L2.

The **bal(** command is located in the CALC menu of the Finance App.

11. Highlight L3 and press **[enter]**.

Enter **seq(ΣInt(D,D),D,1,12)** in L3.

The **ΣInt(** command is located in the CALC menu of the Finance App.

12. Highlight L4 and press **[enter]**.

13. Enter **PMT – [2nd] [L3]** in L4.

The PMT variable can be found in the VARS menu of the Finance App.

L1 through L4 constitute the amortization table for this example.

NORMAL FIX2 AUTO REAL DEGREE MP					
L1	L2	L3	L4	L5	2
1.00	-----	-----	-----	-----	
2.00					
3.00					
4.00					
5.00					
6.00					
7.00					
8.00					
9.00					
10.00					
11.00					

L2=seq(bal(B),B,1,12)

NORMAL FIX2 AUTO REAL DEGREE MP					
L1	L2	L3	L4	L5	3
1.00	921.15	-----	-----	-----	
2.00	841.51				
3.00	761.08				
4.00	679.84				
5.00	597.79				
6.00	514.92				
7.00	431.22				
8.00	346.68				
9.00	261.30				
10.00	175.06				
11.00	87.96				

L3=seq(ΣInt(D,D),D,1,12)

NORMAL FIX2 AUTO REAL DEGREE MP					
L1	L2	L3	L4	L5	3
1.00	921.15	-10.00	-----	-----	
2.00	841.51	-9.21			
3.00	761.08	-8.42			
4.00	679.84	-7.61			
5.00	597.79	-6.80			
6.00	514.92	-5.98			
7.00	431.22	-5.15			
8.00	346.68	-4.31			
9.00	261.30	-3.47			
10.00	175.06	-2.61			
11.00	87.96	-1.75			

L3(1)=-10

NORMAL FIX2 AUTO REAL DEGREE MP					
L1	L2	L3	L4	L5	4
1.00	921.15	-10.00	-----	-----	
2.00	841.51	-9.21			
3.00	761.08	-8.42			
4.00	679.84	-7.61			
5.00	597.79	-6.80			
6.00	514.92	-5.98			
7.00	431.22	-5.15			
8.00	346.68	-4.31			
9.00	261.30	-3.47			
10.00	175.06	-2.61			
11.00	87.96	-1.75			

L4=PMT-L3

NORMAL FIX2 AUTO REAL DEGREE MP					
L1	L2	L3	L4	L5	4
1.00	921.15	-10.00	-78.85	-----	
2.00	841.51	-9.21	-79.64		
3.00	761.08	-8.42	-80.43		
4.00	679.84	-7.61	-81.24		
5.00	597.79	-6.80	-82.05		
6.00	514.92	-5.98	-82.87		
7.00	431.22	-5.15	-83.70		
8.00	346.68	-4.31	-84.54		
9.00	261.30	-3.47	-85.38		
10.00	175.06	-2.61	-86.24		
11.00	87.96	-1.75	-87.10		

L4(1)=-78.848788678342