TEXAS INSTRUMENTS

Graphing Calculator Apps Guide for the TI-82 Advanced Edition Python

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Contents

Using CellSheet™ App

The CellSheet™ application combines spreadsheet functionality with the power of a graphing calculator. Using the CellSheet™ application, you can:

- Create spreadsheets using
    - Integers
    - Real numbers
    - Formulas
    - Variables
    - Text and numeric strings
    - Functions
- Create cell formulas
- Use built-in functions
- Create spreadsheets containing 999 rows and 26 columns
- Enter data that is limited only by the available memory (RAM)

Example Activity – Simple Compound Interest

Use this activity to learn the basics of the App.

1. Press [apps].
2. Choose **2:CellSheet** from the **APPLICATIONS** menu. The splash screen will pop up.
3. Press any key other than [2nde] [quitter].

   The Help screen will appear.
   The function keys enable spreadsheet functionality (**Select Range**, **Cut**, **Copy**, **Paste**, and **Menu**).
   The [sto→] and [rappel] keys are overwritten to provide quick access to common spreadsheet characters (= to start formula, **$** to add absolute reference).
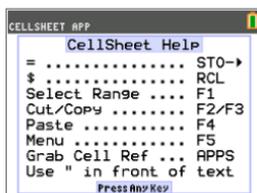
CellSheet Help	
ACTION	**PRESS THIS KEY**
=	[sto→]
$	RCL [2nde] [rappel]
Select Range	[f1]
Cut	[f2]
Copy	[f3]
Paste	[f4]
Menu	[f5]

CellSheet Help	
Grab Cell	[apps]
Press Any Key	

1. Press any key for the spreadsheet to appear.
   The edit line with the cell reference appears on the left side.
   The Menu soft key appears above [F5], as listed on the CellSheet Help screen.

Note:

- Press the arrows to show that the cursor moves from cell to cell. The cell reference at the left side of the edit line changes as the cursor moves around.

- Use [alpha] with the arrow keys to move up/down/ left/right one screen at a time.

- Use the arrow keys to move into a row/column heading to select the entire row/ column or into the very top-left corner to show the file name on the edit line.

2. Scroll to cell A1. Press [entrer].

   The cursor is active on the edit line, and the Menu soft key disappears so you can use the entire edit line. Type in a principal amount, for example: 1,000. Simply type the number in and press [entrer].
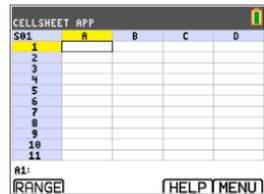
3. The cursor has moved down to cell A2. Now type in an annual interest rate, for example: 0.06. Press [entrer].
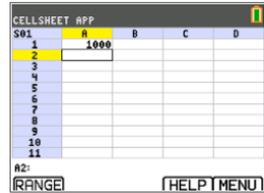
4. To create a column for time:

   a) Scroll to cell B1 and type "YEAR (using the [alpha] key or Alpha Lock [2nde] [verr **A**]as needed).
   Note: You must add a quotation mark before the word YEAR. The quotation mark tells CellSheet to treat this as text rather than as a variable.

   b) Press [entrer].
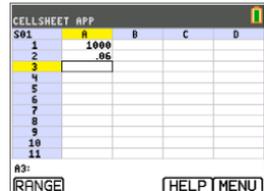
5. To designate time periods using a formula:

   a) In cell B2, press $\boxed{1}$ to designate year 1.

   b) Press $\boxed{\text{entrer}}$ to move to cell B3.

   c) Type the first formula =B2+1 (using the $\boxed{\text{alpha}}$ key or Alpha Lock $\boxed{\text{2nde}}$ [verr ◪]as needed).
   Note: $\boxed{\text{sto→}}$ is the shortcut key for the = sign, as listed on the CellSheet Help screen.

   d) Press $\boxed{\text{entrer}}$.
   The cell should return the value 2 for year 2.

   e) Press the up arrow to see that the formula is still on the edit line for that cell.
   Note: You can copy the formula down the column. See CellSheet Help for copy [f3] select range [f1], and paste [f4] shortcut keys.

6. Create a sequence using the **Séquence** option from the **Options** menu:

   a) Press [f5] to open the menu.

   b) Choose **3:Options**..., then **3:Séquence**....
   The input screen will appear.

   c) Fill in the fields as indicated in the screen.

   d) Scroll to the **Entrer** area.

   e) Press $\boxed{\text{entrer}}$.
   A sequence from 3 to 10 fills in from cell B4 down.

7. Create a column for the balance.

   a) Press the $\boxed{\blacktriangle}$ and $\boxed{\blacktriangleright}$ keys to scroll to cell C1 and type "BAL (using the $\boxed{\text{alpha}}$ key or Alpha Lock $\boxed{\text{2nde}}$ [verr ◪] as needed).

   b) Press $\boxed{\text{entrer}}$.

8. For the balance at the end of year 1:

   a) Enter the formula =$A$1*(1+$A$2)^B2 (remember to use [sto→] for = and [2nde] [sto→] for $) (using the [alpha] key or Alpha Lock [2nde] [verr **A**] as needed).

      The $ signs must be used because in order to copy the formula down the column, you need to create an absolute reference to cells A1 and A2 to make sure that the original principal and interest rate are the same in every copied formula.

      Note: [sto→] is the shortcut key for the = sign, and [2nde] [rappel] are the shortcut keys for the $ sign, as listed on the CellSheet Help Screen.

   b) Press [entrer].

To watch the balance grow over time, copy cell C2 and paste it to the range C3:C11 as follows:

9. To copy the cell:

   a) Press the [▼] key to scroll to cell C2.

   b) Press [f3] to copy the cell.

10. To select the range:

    a) Press the [▼] key to scroll to cell C3.

    b) Press [f1] to choose a range to copy to.

    c) Press the [▼] key to select the cells in the range from C3:C11.

    d) Press [f4] to paste to this range.

11. After watching the balance grow, experiment by changing the interest rate in cell A2. Simply scroll to cell A2, change the number, and watch all of the balance values update. You can also experiment by changing the principal.

Menus and Functions

- To display the CELLSHEET MENU, select **Menu** (press [f5]).

- To display a help screen for common tasks, select **Help** from the CELLSHEET MENU.

- To exit the application, select **Quit CellSheet** from the CELLSHEET MENU.

- Press [annul] or [2nde] [annul] to:

- Return to the main menu from a submenu.
- Return to the spreadsheet from the main menu.

Menus	Functions
File Menu	
1: Ouvrir	Opens an existing spreadsheet file.
2: Enreg sous...	Saves the current spreadsheet with the same name or with a different name.
3: Nouv...	Creates a new spreadsheet and allows you to use a new or existing name.
4: Supprimer...	Deletes a spreadsheet. You cannot delete the currently open spreadsheet.
5: Format...	Sets up formatting options. (Default values are highlighted.) AutoCalc: Y N Mvmt Curseur: ▾ ▸ Aide Init: Y N Voir: FMLA VALUE
6: Recalc	Recalculates the spreadsheet (only needed when the autocalculation feature in the FORMAT menu is turned off).
Edite Menu	
1: Aller cellule...	Moves the cursor to a specific cell.
2: Ann suppr Cell	Retrieves the contents of the cell that you just deleted or cleared.
3: Efface Feuille	Deletes all data from the current spreadsheet.
4: Sélect Plage	Selects a range of cells.
5: Couper	Cuts the contents and formulas from the currently selected cell, or range of cells, and places them on the clipboard. Shortcut key: [f2]
6: Copier	Copies the contents and formulas from the currently selected cell, or range of cells, and places them on the clipboard. Shortcut key: [f3]
7: Coller	Pastes the contents and formulas that were just cut or copied to the clipboard into the current cell. Shortcut key: [f4]
Options Menu	
1: Statistiques...	Calculates linear regression for the currently selected cell range.

Menus	Functions
	1: 1-variable statistics
	2: 2-variable statistics
	3: Linear Regression - LinReg(ax+b)
2: Remplir Plage...	Fills a range of cells with a formula, number, or text.
3: Séquence...	Fills a range of cells with a sequence of numbers.
	1ére Cell:
	suite(
	Bas Droite
4: Import/Export ...	Imports and exports calculator files such as lists, matrices, or variables.
5: Tri...	Sorts a range of cells in ascending or descending order.
6: Col Décimal...	Sets the decimal mode display for a column. The calculator decimal mode display (accessed by pressing mode) does not affect the CellSheet™ application.
Graphiques Menu	
1: Nuage...	Displays a scatter chart for a range of cells.
	PlageX:
	PlageY1:
	PlageY2:
	PlageY3:
	Titre:
	AxesAff Axes NAff
	DessinAj Dessin
2: Fen Nuages...	Displays the parameters for the viewing window for the scatter chart so that you can change the values.
	Xmin=
	Xmax=
	Xgrad=
	Ymin=
	Ymax=
	Ygrad=
	Dessin Enreg
3: Ligne...	Displays a line chart for a range of cells.
	PlageX:
	PlageY1:
	PlageY2:

Menus	Functions
	PlageY3:
	Titre:
	AxesAff Axes NAff
	DessinAj Dessin
4: Fen Ligne...	Displays the parameters for the viewing window for the line chart so that you can change the values.
	Xmin=
	Xmax=
	Xgrad=
	Ymin=
	Ymax=
	Ygrad=
	Dessin Enreg
5: Barres...	Displays a bar chart for a range of cells.
	Catégories:
	Série1:
	NomSér1:
	Série2:
	NomSér2:
	Série3:
	NomSér3:
	Titre:
	Vericale Horiz
	DessinAj Dessin
6: Fenêtre Barres	Displays the parameters for the viewing window for the bar chart so that you can change the values.
	Barmin=
	Barmax=
	Dessin Enreg
7: Secteurs...	Displays a pie chart for a range of cells.
	Catégories:
	Série:
	Nombre Pourcent
	Titre:
	Dessin:

Error Messages

Error Message	Description
INVALID CELL, INVALID RANGE.	This occurs when you type in an invalid cell or a range such as A0, BZ12, or A1:A1000. Valid cells are A1 to Z999.
CIRCLE REF	This occurs when the logic of cell formulas results in a loop, for example when A1 is set to =A1.
CANNOT SORT	The CellSheet™ application does not sort ranges that contain formulas.
INVALID NAME	The name that you entered is too long, or contains characters that are invalid.
INVALID LIST, INVALID MATRIX, INVALID VAR	The list name, matrix name, or variable name does not exist.
SYNTAX	This occurs when you enter an invalid cell reference (e.g., A0), or if you delete a cell that is referred to by another cell.

Using Inequality Graphing App

The Inequality Graphing App gives you new features for graphing equations and inequalities and evaluating the relationship between them. Using the Inequality Graphing application, you can:

•   Enter inequalities using relation symbols

•   Graph inequalities and shade the union and intersection regions

•   Enter inequalities (vertical lines only) in an X=editor

•   Trace points of interest (such as intersections) between relations

•   Store (x,y) coordinate pairs to lists for viewing and optimizing functions for linear programming

Example Activity – Inequality Graphing

Use this activity to learn the basics of the App.

1. Press [apps] and choose Inequalz. Press any key to access the inequality graphing editor . The cursor will blink over the = sign.

    Note: Press any key to dismiss the splash screen.

    Note: Press [Y=] and the operating system function editor now supports the Inequality Graphing features.

2. Press [alpha] [fenétre] [◄] to change the equals sign to a "less than" sign. (While using Inequality Graphing, use the [alpha] key to activate the soft keys. [◄] is a soft key.)

3. Enter Y1<2x-3. (This App will shade any results that are less than this function when the function is graphed.)

4. Press [alpha] [trace] [►] to change the equals sign to a "greater than" sign.

5. Enter Y2>-2x+5. (The App will shade any results that are greater than this function when the function is graphed.).

6. Press [graphe]. The graph will show all results that are less than 2x-3 and greater than -2x+5. The intersection of the two functions is shaded differently.
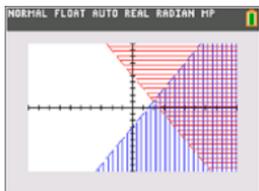
7. Examine just the intersection of these two inequalities by pressing [2nde] [trace]. Press [▶] to go to the Inequalities Menu and select [1] : **Point of Interest Trace**.
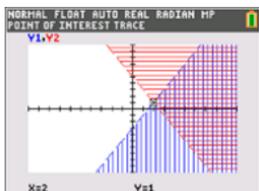
8. Highlight **1:Ineq** Intersection and press [entrer]. The graph produced will be only the intersection of the two inequalities.
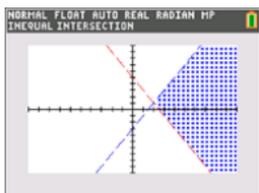
9. Press [2nde] [trace] [▶] to go to the Inequalities Menu and select [2] : **Inequal Intersection**. The graph produced will be only the intersection of the two inequalities.

Menus and Functions

• The app will continue running until it is turned off. Press [apps] and then select **Inequalz**. Select **2: Quit Inequal**.

Menus	Functions
Graph/Plot Setup Keys	
Y=	Displays the Y= Editor, where you can enter one or more inequalities to graph and change the graph color and line style.
X=	Graph a vertical inequality.
Window	Set the viewing window to produce the best display of your graph.
Zoom	Quickly adjust the window to a pre-defined setting.
Trace	Move the cursor along the graphed function using [◄] and [▶].

Menus	Functions
Graph	Display the graph you have defined..
Inequality Menu	
Inequality	.
1: Point of Interest Trace	Trace points of interest (such as intersections) between relations.
2: Inequal Intersection	Display the intersection of the inequalities.
3: Union	Display the combined area of the inequalities.
4: Original ShadeRes=	Return to the original inequality graph.
5: Inequality App Help	Help file for Inequality Graphing.
Quit Menu	
1: Continue Running	Continue using the Inequality Graphing app.
2: Quit	Quit the app.
3: About	Display the opening screen with version number information.

Error Messages

Error Message	Description
ERR: MEMORY 600 Bytes Free RAM Needed 1: Quit Inequal	The calculator does not have enough free RAM to create the INEQVAR AppVar. Delete some items to free at least 600 bytes of RAM.
Conflicting APPS 1: Quit Inequal 2: Quit Apps listed below	One or more applications that are currently running use the same resources as the Inequality Graphing application. To run the Inequality Graphing application, you must quit the conflicting application(s).
ERR: INEQVAR 1:Overwrite 2:Quit Inequal	An AppVar named INEQVAR already exists, but it is not related to this application. Select one of the following options: 1. Overwrite to overwrite the current AppVars. 2. Quit Inequal to quit the application. Inequality Graphing will not run without the correct version of INEQVAR. You must either rename the existing AppVar or let Inequality Graphing overwrite it.
ERR: Data Type 1: Quit 2: Goto	An X-variable (in the X=editor) evaluates to a number that is not real. Select one of the following options: 1. Quit to restore the previous value for that X-variable. 2. Goto to change the X-variable so that it evaluates to a real

Error Message	Description
	number.
ERR: Divide by 0 1:Quit 2:Goto	You have entered an expression on the Y=Editor or X=Editor that is divided by zero. Select one of the following options: 1. Quit to restore the previous value for that X-variable. 2. Goto to change the expression so that it evaluates to a real number.

Using Polynomial Root Finder & Simultaneous Equation Solver App

The Polynomial Root Finder & Simultaneous Equation Solver application:

- **Calculates the roots (zeros) of polynomials of degree 1 through 10, with a convenient, easy to use interface**.

  You can enter the coefficients to a polynomial to solve, store solutions into lists, load lists into the App as coefficients, and store the polynomial to a Y-Var to graph after quitting the App.

- **Finds solutions to systems of linear equations**.

  You can enter a system of equations to solve, load matrices containing the coefficients of a linear system, and identify whether a given system has a unique solution, an infinite number of solutions, or no solution.

Example Activity – Polynomial Root Finder

Use this activity to learn the basics of the App.
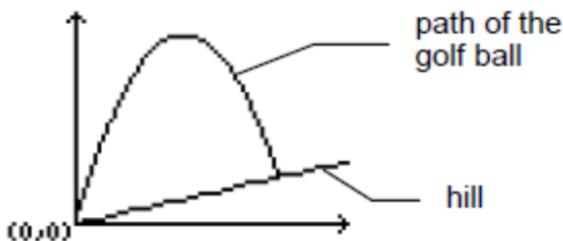
A golfer hits a golf ball from a tee at the bottom of a hill.
You can describe the hill by y(x) =0.8x.
The ball follows the path y(x) = -x^2 + 12x.

If the golfer is standing at the tee (0, 0) and hits the ball, where does the ball hit the ground on the hill?

First, equate the two equations:

$x^2 + 12x = 0.8x$

$-x^2 + 11.2x = 0$

The roots of the resulting polynomial will give the intersection points of the ball path and the hill.

1. Press [apps] to display a list of applications on your calculator.

2. Select **PlySmlt2**.

    The **ABOUT** screen displays.

3. Press any key to continue.

    The **MAIN MENU** displays.
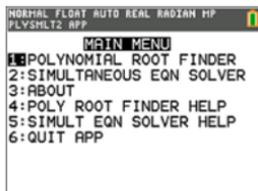
4. Select **POLYNOMIAL ROOT FINDER**.

5. Select the degree of the polynomial as **ORDER 2**.
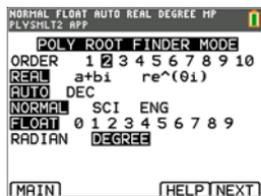
6. Press **NEXT**($\boxed{\text{graphe}}$). Enter the coefficients of -x^2+11.2x=0.

   Note: You can also change the operation in the polynomial as needed.
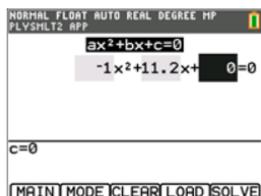
7. Select **SOLVE** ($\boxed{\text{graphe}}$) to calculate and display the roots. Two answers are displayed in fraction form as shown. Press **[F ◀▶ D]** ($\boxed{\text{graphe}}$) to toggle to the decimal results:
   $x1 = 0$ and $x2 = 56/5$

   Note: If you exit the application, graph the two functions, and find their intersection (press $\boxed{\text{2nde}}$ [calculs] and then select Intersect), you can see that the ball starts at (0, 0) and hits the hill at (11.2, 8.96).
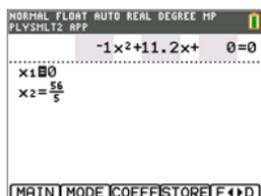
Example Activity – Simultaneous Equation Solver

Use this activity to learn the basics of the App.

A small corporation borrowed $500,000 to expand its product line. Some of the money was borrowed at 9% interest, some at 10%, and some at 12%. How much was borrowed at each rate if the annual interest was $52,000 and the amount borrowed at 10% was 2.5 times the amount borrowed at 9%?

Let x = amount of money borrowed at 9%

y = amount of money borrowed at 10%

z = amount of money borrowed at 12%

1. Write an equation for each of the statements:

   x + y + z = 500,000

   0.09x + 0.1y + 0.12z = 52,000

   2.5x − y = 0

2. Press [apps] to display a list of applications on your calculator.

3. Select **PlySmlt2**. The information screen displays.

4. Press any key to continue. The **MAIN MENU** displays.
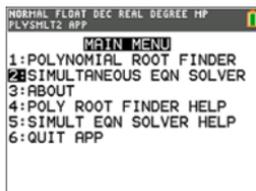
5. Select **Simultaneous Eqn Solver**.

6. Select 3 equations and 3 unknowns on the Simultaneous Equation Solver Mode screen. Press **NEXT** to continue.
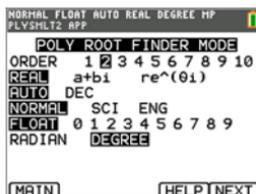
7. Enter the coefficients for the variables and the constants in the equation. Press [entrer] after each entry to move the cursor to the next position.
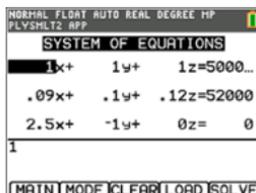
8. Select **SOLVE** (graphe) to solve the system of equations. You see that the corporation borrowed $100,000 at 9%, $250,000 at 10%, and $150,000 at 12%.

Menus and Functions

- To display the MAIN MENU, select **Menu** (press graphe).
- To exit the application, select **Quit App** from the **MAIN MENU**.

Menus	Functions
Main Menu	
1: Polynomial Root Finder	Open the Polynomial Root Finder app.
2: Simultaneous Eqn Solver	Open the Simultaneous Equation Solver app.
3: About	Display the home screen with the version number.
4: Poly Root Finder Help	Help file for Polynomial Root Finder. Press 2nde [quitter] to return to the Main Menu.
5: Simult Eqn Solver Help	Help file for Simultaneous Equation Solver. Press 2nde [quitter] to return to the Main Menu.
Polynomial Root Finder Menus	
Order	Set from 1 to 10.
Real / a+bi / re^θi	Real mode does not display complex results. If you select this mode setting and the answer is complex, the result displays as NONREAL. a+bi (rectangular complex) mode displays complex numbers in the form a+bi. You may need to press ▸ to display all of the complex number. re^θi (polar complex) mode displays complex numbers in the form of reθi. You may need to press ▸ to display all of the complex number.
Normal / Sci / Eng	Set the notation mode to Normal, Scientific, or Engineering.
Float	Floating decimal mode displays up to 10 digits, plus the sign and decimal..
Radian / Degree	Interpret angle values and display answers in radians or degrees.

Menus	Functions
Main	Display the main menu.
Help	Open the help file.
Next	Go to the next page.
Main	MAIN displays the main menu
Mode	Return to the mode screen.
Clear	Clear all of the coefficient values that you have entered.
Load	Enter a list name that contains the coefficient values you want to use. You must set up the list in the list editor before you can use the list in the Polynomial Root Finder application. You cannot access the list editor while the application is running.
Solve	
Main	MAIN displays the main menu.
Mode	Return to the mode screen.
Coeff	Change the coefficient.
Store	Store the coefficients to a list, store polynomial to Y= or store roots to a list.
F ◀ ▶ D	convert values from fraction to decimal.
Simultaneous Eqn Solve	
Equations	Set the number of equations.
Unknowns	Set the number of unknowns
Auto / Dec	AUTO displays answers in a similar format as the input. DEC displays answers as integers or decimal numbers.
Normal / Sci / Eng	Set the notation mode to Normal, Scientific, or Engineering.
Float	Floating decimal mode displays up to 10 digits, plus the sign and decimal..
Radian / Degree	Interpret angle values and display answers in radians or degrees.
Main	Display the main menu.
Help	Open the help file.
Next	Go to the next page– System of Equations.
Main	MAIN displays the main menu

Menus	Functions
Mode	Return to the mode screen.
Clear	Clear all of the matrix values that you have entered.
Load	Enter a matrix name that contains the matrix values you want to use. You must set up the matrix in the matrix editor before you can use the matrix in the app. You cannot access the matrix editor while the application is running.
Solve	Solve the system of equations. The entire solution may not fit on one screen. If an arrow displays on the left side of the screen, press $\boxed{\blacktriangledown}$ and $\boxed{\blacktriangle}$ as necessary to view the entire solution. Each line of the matrix may not fit on the screen. Press $\boxed{\blacktriangleright}$ to scroll to the right to view the part of the line that is off the screen.
Main	MAIN displays the main menu.
Mode	Return to the mode screen.
Sysm	Display the system of equations screen so you can view or change the values
Store	Store the system matrix or the solution matrix.
rref	Display the reduced row-echelon form of a matrix that has either no solution or infinite solutions.
Main	Display the main menu.
Back	Return to the solution set.
Sysm	Display the matrix entry screen so that you can view or change the values.
Store rref	Store the reduced rowechelon form of a matrix to a matrix variable that you select..

Using Probability Simulation App

Explore probability theory with animation that simulates the following:

• Toss coin

• Roll dice

• Pick marbles

• Spin spinner

• Draw cards

• Generate random numbers

Options include:

• Display of Data:
    - Bar Graph
    - Table of trials data
• Settings
    - Customize simulation
    - Number of trials
    - Weighting

You can save simulation data to lists for further exploration.

Example Activity – Toss Coins Simulation

Use this activity to learn the basics of the App.

1. With the hand held turned on, press [apps] and select ProbSim.

2. Select the type of simulation. For this example, select **1: Toss Coins**..

3. For this Application, the following key commands are used. Press:

   ESC to move to previous screen,

   TOSS to toss one coin and access more tosses,

   SET to get to the Settings screen (see below),

   DATA to store the collected data to a list,
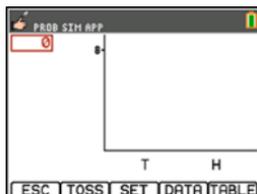
TABL to show a table of the trials, and

GRPH to show a graph of the trials.

You can toggle between the table and the graph.

4. Change these settings depending on what values are needed for the simulation. Press **ADV** from the **Settings** screen to change the weight of the coins.
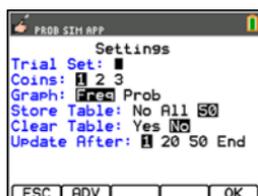
5. Currently, the coins are equally weighted. Press **OK** when the settings and the weight for the simulation are appropriate. Next, press TOSS .
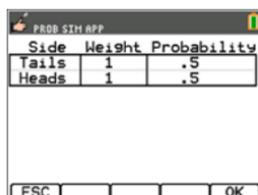
6. One coin will toss. Now, press **+1**, **+10**, or **+50** depending on the data you wish to collect. The Frequency Graph updates with each coin toss. Press <ESC> when finished tossing the coins for this simulation.
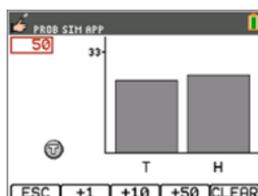
7. Next, press **ESC** and examine the table (**TABL**) or use **DATA** to store the data into lists.
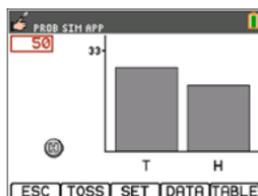
8. Press **TABL** to see the value for each toss and the cumulative number of heads for the number of trials.

9. Press **DATA** to store the data in lists, which can be accessed later in the List Editor. The values of 0 for Tails and 1 for Heads are stored in list LC1.

10. Next, quit the App by pressing **OK, <ESC, YES, QUIT, YES**. Make sure to save the data in lists (as shown above) so the simulation remains in memory when you turn the graphing calculator off.

Menus and Functions

Each simulation has features appropriate for the type of simulation. The table below is a quick guide to see the features and options in each simulation.

- The main menu will appear when you open the App.
- Press **ESC** (press f(x)) and **YES** (press f(x)) to return to the main menu from a simulation.
- To exit the application, select **QUIT** (press graphe) from the main menu.

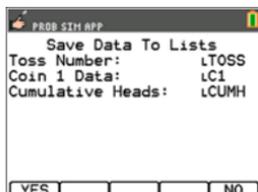| Menus	Functions
Main Menu	
Toss Coins	Creates a simulation of a two-sided coin toss, and you have the option to weight the sides of the coin. You can flip up to 3 coins at once, and the number of heads is tallied.
Roll Dice	Creates a simulation of rolling up to three dice. The type of dice includes 6, 8, 10, 12, and 20 sides. The sum of the faces is tallied.
Pick Marbles	Creates a simulation of picking up to 5 different marbles from a bag. The simulation can run with or without replacement. The number of each type of marble in each pick is tallied.
Spin Spinners	Creates a simulation of one spinner with between 2 and 8 sections. Each section can be weighted. The spinner results are tallied.
Draw Cards	Creates a simulation of drawing one card at a time from a 52- or 32-card deck. For each pick, the number and suit are tallied. The draw of a card from the deck can be set with or without replacement from each draw. You can only use one deck at a time.
Random Numbers	Generates (draws) a set of up to 6 random numbers. The number range can be set from 0 to 99. Repetition or no repetition of numbers from the range can be set as an option.

Menus	Functions
	Each draw of the random set is tallied on the screen.
OK	Open the selected simulation.
SEED	Set the random seed value.
ABOUT	App version number information.
QUIT	Exit the application.
Toss Coins	
ESC	Return to the previous screen
TOSS	Toss one coin and access more tosses.
SET (Settings)	Change the settings for the simulation.
Trial Set	Tosses coin(s) as per trial settings and allows shortcut option to toss +1, +10, or +50 more tosses to add on to the simulation. Enter trial value from 1 to 999 tosses.
Coins	Set the number of coins tossed per trial to 1, 2, or 3.
Graph	Set graph display to frequency or simulated probability. Use right and left arrows on the bar graph view to display these values.
StoTbl (Store Table)	Set to No, All, or 50 to control the trials displayed in the table view.
ClearTbl (Clear Table)	Set to Yes if you want to clear the data of an existing simulation.
Updates (Update After)	Number of trials before the graph and data are updated.
DATA	Save the collected data to a list.
TABLE	Show a table of the trials.
GRAPH	Show a graph of the trials.
Roll Dice	
ESC	Return to the previous screen
ROLL	Rolls a die or dice as per trial settings and allows shortcut option to toss +1, +10, or +50 more rolls to add on to the simulation.
SET (Settings)	Change the settings for the simulation.
Trial Set	Enter trial value from 1 to 999.
Dice	Set the number of die or dice tossed per trial to 1, 2, or 3.

Menus	Functions
Sides	Set number of sides to 6, 8, 10, 12, or 20.
Graph	Set graph display to frequency or simulated probability. Use right and left arrows on the bar graph view to display these values.
StoTbl (Store Table)	Set to No, All, or 50 to control the trials displayed in the table view.
ClearTbl (Clear Table)	Set to Yes if you want to clear the data of an existing simulation.
Updates (Update After)	Number of trials before the graph and data are updated.
DATA	Save the collected data to a list.
TABLE	Show a table of the trials.
GRAPH	Show a graph of the trials.
Pick Marbles	
ESC	Return to the previous screen
PICK	Pick number of marbles as per trial settings.
SET (Settings)	Change the settings for the simulation.
Trial Set	Enter trial value from 1 to 999.
Types	Set the number of different types of marbles in the simulation to 1, 2, or 3.
Graph	Set graph display to frequency or simulated probability. Use right and left arrows on the bar graph view to display these values.
StoTbl (Store Table)	Set to No, All, or 50 to control the trials displayed in the table view.
ClearTbl (Clear Table)	Set to Yes if you want to clear the data of an existing simulation.
Replace	Yes: Replaces the marble after it is drawn. No: The marble is removed when it is drawn.
Updates (Update After)	Number of trials before the graph and data are updated.
DATA	Save the collected data to a calculator list.
TABLE	Show a table of the trials.
GRAPH	Show a graph of the trials.
Spin Spinner	

Menus	Functions
ESC	Return to the previous screen.
SPIN	Spins the spinner as per trial settings and allows shortcut option to toss +1, + 10, or +50 more spins to add on to the simulation.
SET (Settings)	Change the settings for the simulation.
Trial Set	Enter trial value from 1 to 999.
Sections	Set the number of sections of the spinner from 2 to 8 sections.
Graph	Set graph display to frequency or simulated probability. Use right and left arrows on the bar graph view to display these values.
StoTbl (Store Table)	Set to No, All, or 50 to control the trials displayed in the table view.
ClearTbl (Clear Table)	Set to Yes if you want to clear the data.
Updates (Update After)	Number of trials before the graph and data are updated.
DATA	Save the collected data to a list.
TABLE	Show a table of the trials.
GRAPH	Show a graph of the trials.
Draw Cards	
ESC	Return to the previous screen
DRAW	Draw one card.
SET (Settings)	Change the settings for the simulation.
Decks	Set to 1, 2, or 3 decks.
Replace	Yes: Replaces the card after it is drawn. No: The card is removed when it is drawn.
Deck Size	Set the card deck size to 52 or 32 cards.
DATA	Save the collected data to a list.
CLEAR	Clear all trials from memory.
Random Number Sets	
ESC	Return to the previous screen.
Draw	Roll one dice.
SET (Settings)	Change the settings for the simulation.

Menus	Functions
Numbers	Set between 1 and 6 random numbers per draw.
Range	Enter the range of numbers from 0 to 99.
Repete	Yes: Reuse numbers after they have been chosen. No: each trial will be unique.
DATA	Save the collected data to a list.
CLEAR	Clear all trials from memory.
Advanced Options Menu	
ADV (Advanced)	Set weight or probabilities for Toss Coin, Roll Dice, or Spin Spinner outcomes. Set the amount of each different marble in the simulation for Pick Marbles.

Error Messages

Error Message	Description
There is no data to export. Memory Error	No simulations were stored.
There is not enough memory to export data. Maximum Trials Reached	Leave the App and delete memory to create room to store your simulations.
Not enough memory to store more individual trials.	Leave the App and delete memory to create room to store your simulations.

Python82 App for the
TI-82 Advanced Edition Python

TI-Python is based on CircuitPython, a variant of Python 3 for teaching coding. It was developed by Adafruit and adapted for use by TI.

The interpreter of your Python program is executed within this TI-Python environment, separate and different from the CE OS calculations. Calculations may also vary from other versions of Python due to number type storage in the Python version.

The Python82 App offers the following to support your Python programming on your calculator.

- File Manager to list the Python programs (Python AppVars) stored in RAM on your calculator.
- Editor to create new programs in your calculator and edit existing Python programs.
- Shell to display output of your Python program or to run Python commands at the Shell prompt. This environment is also referred to as an interpreter or console.

The Python modules available to import are math, random and time.

Note: There is no programming offered in either TI-Basic or Python82 to program TI-Innovator™ or TI-Innovator Rover.
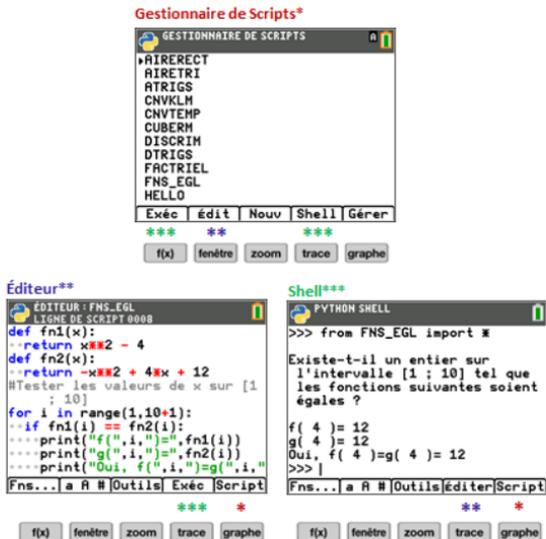
Using Python82 App

The Python82 App offers a File Manager, an Editor to create programs, and a Shell to run programs and interact with the Python interpreter. Python programs stored or created as Python82 AppVars will execute from RAM. You may store Python82 AppVars in Archive for memory management 2nde [mém] 2:.

Python82 App Navigation

Use the shortcut keys on the screen in the App to navigate between workspaces in the Python82 App. In the image, the shortcut tab labels indicate:

* Navigation to the File Manager [Script]

** Navigation the Editor [Édit] or [Éditer]

*** Navigation to the Shell [Shell]

Access shortcut tabs on the screen using the graphing key row immediately under the screen. Also, see Keypad . The Editor>Tools menu and Shell>Tools menu also contain navigation actions.

Gestionnaire de Scripts*

```
GESTIONNAIRE DE SCRIPTS
▶AIRERECT
 AIRETRI
 ATRIGS
 CNVKLM
 CNVTEMP
 CUBERM
 DISCRIM
 DTRIGS
 FACTRIEL
 FNS_EGL
 HELLO
Exéc | édit | Nouv | Shell | Gérer
```

*** ** ***

f(x) | fenêtre | zoom | trace | graphe

Éditeur**

```
ÉDITEUR : FNS_EGL
LIGNE DE SCRIPT 000B
def fn1(x):
··return x**2 - 4
def fn2(x):
··return -x**2 + 4*x + 12
#Tester les valeurs de x sur [1
   ; 10]
for i in range(1,10+1):
··if fn1(i) == fn2(i):
····print("f(",i,")=",fn1(i))
····print("g(",i,")=",fn2(i))
····print("Oui, f(",i,")=g(",i,"
Fns...| a A # |Outils| Exéc |Script
```

*** *

f(x) | fenêtre | zoom | trace | graphe

Shell**

```
PYTHON SHELL
>>> from FNS_EGL import *

Existe-t-il un entier sur
 l'intervalle [1 ; 10] tel que
 les fonctions suivantes soient
 égales ?

f( 4 )= 12
g( 4 )= 12
Oui, f( 4 )=g( 4 )= 12
>>> |
Fns...| a A # |Outils|Éditer|Script
```

** *

f(x) | fenêtre | zoom | trace | graphe

Example Activity

Use the example activity provided as an experience to become familiar with the workspaces in the Python82 App.

- Create a new program from the File Manager
- Write the program in the Editor
- Execute the program in the Shell in the Python82 App.

Getting Started:

- Run the Python App.

Note: Actual screens may vary slightly from provided images.

Enter new program name from File Manager.

- Press zoom ([Nouv]) to create a new program.

Here is screen text:
```
GESTIONNAIRE DE SCRIPTS
▶BONJOUR
 GRAPHIQ
 LINREG

 Exéc │ édit │ Nouv │ Shell │ Gérer
```
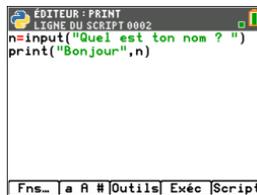
New File Name Entry

- The example program will be PRINT. Enter the program name and press graphe ([Ok]).
- Notice the cursor is in ALPHA lock. Always enter a program name following the given rules on the screen.

TIp: If the cursor is not in ALPHA lock, press 2nde alpha alpha for upper case letters.

Screen text:
```
GESTIONNAIRE DE SCRIPTS
NOUVEAU SCRIPT
Nom=PRINTª

Autorisé
- Jusqu'à 8 caractères
- Premier caractère:AàZ
- Caractères restants:AàZ 0à9 _

         En Option
 échap │   Types   │      Ok
```

Enter program as shown.

TIp: App provides quick entry! Always watch the cursor state as you enter your program!

Screen text:
```
ÉDITEUR : PRINT
LIGNE DU SCRIPT 0002
n=input("Quel est ton nom ? ")
print("Bonjour",n)

 Fns… │ a A # │ Outils │ Exéc │ Script
```

Alphabet characters on Keypad	alpha toggles the insert cursor state in the Editor and Shell.
10^x (N)	_ non-alpha
log	a lower case alpha
	A upper case ALPHA
Where is the equal sign?	Press sto→ when the cursor is _.
rappel X	
sto →	

Where are these located? input() print()	[Fns...] I/O 1:print() 2:input()
Where is double quote?	alpha ["] mém " +
Where are (and)?	Use keypad when cursor is _. { K } L ( )

Try-It! [a A #] and 2nde [catalog] also are helpers for quick entry as needed!

Execute the program PRINT

Shell cursor state indicator.

- From the Editor, press trace ([Éxec]) to execute your program in the Shell.
- Enter your name at the "Quel est ton nom ?" prompt.
- Output displays "Bonjour" with your name.

Input your name.

Output of PRINT displays.


```
PYTHON SHELL
>>> # Shell Reinitialized
>>> # L'exécution de PRINT
>>> from PRINT import *
Quel est ton nom ? CE
Bonjour CE
>>> |

Fns…  |a A #|Outils|Éditer|Script
```

Note: At the Shell prompt >>>, you can execute a command, such as 2+3. If you use any method from math, random, or other available modules, be sure to execute an import module statement first as in any Python coding environment.

Setting up a Python Session with your Programs

When the Python82 App is launched, the CE connection with the TI-Python experience will synchronize for your current Python session. You will see your list of programs in RAM and dynamic modules, as they synchronize to the Python experience.

When the Python session is established, the status bar contains a green square indicator near the battery icon that signals the Python session is ready for use. In the event the indicator is red , wait for the indicator to change back to green when the Python experience is again available.

You may see an update of the Python distribution when launching the Python82 App along with program synchronization after the latest update for your TI-82 Advanced Edition Python from education.ti.com/fr.

Disconnecting and Reconnecting the Python82 App

When the Python82 App is running, the status bar contains an indicator that signals whether Python is ready for use. Until the connection is established, the CE keypad may not respond. Best practice is to be aware of the status bar connection indicator while in your Python session.

Python Not Ready   Python Ready

Screen Captures

Using TI Connect™ CE v5.6.3 or higher at education.ti.com/fr, screen captures of any Python82 App screen are allowed.

Using Transformation Graphing App

Transformation Graphing App enhances the $\boxed{y=}$ function mode and lets you observe the effects of changing coefficient values without leaving the graph screen. The transformation feature is only available in function mode ($\boxed{\text{mode}}$).

Transformation Graphing allows you to manipulate up to four coefficients on the graph: A, B, C, and D. All other coefficients act like constants, using the value in memory. You step through the transformation of a function or animate the transformation using play styles, play/pause, play and fast play. You can enter functions directly or use the color/line style spinner dialog to paste functions such as:

AX + B

AX^2 + B

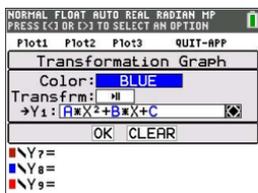A(X-B)^2 + C

A(X-B)(X-C)

AX^2 + BX + C

A(X-B)^3 + C

AX^3 + BX^2 + CX + D

A abs(B(X-C)) + D
A sin(B(X-C)) + D
A cos(B(X-C)) + D
A tan(B(X-C)) + D

## *Example Activity*

Explore the Function Y=AX^2+BX+C

Use this activity to learn the basics the Transformation Graphing App.

Note: Reset the calculator defaults ($\boxed{\text{2nd}}$ $\boxed{\text{mem}}$ **7:Reset...**, **2:Defaults...**, **2:Reset**) before this performing this activity.

1. Press $\boxed{\text{apps}}$.
2. Choose **Transfrm**.
3. Read the message on the splash screen.
4. Press any key to dismiss the splash screen.

5. In Func mode, press $\boxed{y=}$ to display the Y= editor.

6. Press $\boxed{\text{clear}}$ to clear Y1.

7. To quickly paste the function Y1=AX2+BX+C, press $\boxed{\blacktriangleleft}$ $\boxed{\blacktriangleleft}$ $\boxed{\text{entrer}}$ to launch the line style spinner.

8. Press $\boxed{\blacktriangledown}$ $\boxed{\blacktriangledown}$ and then $\boxed{\blacktriangleright}$ to the desired function.

9. Select OK and press $\boxed{\text{entrer}}$.
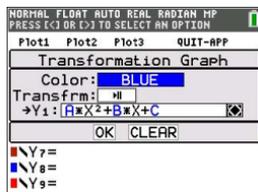
   Note: The color/line style spinner dialog also lets you select the animation of the transform graph. Play-Pause >II will allow you to control the animation of the graph using the arrow keys on the graph screen.
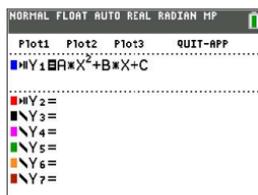
Tip: If you enter a function using the keypad, only A-D are allowed in transform equations Y1 and/or Y2. Those letters can be found using the $\boxed{\text{alpha}}$ key. For example, to enter the coefficient **A**, press $\boxed{\text{alpha}}$ **[A]** (above the $\boxed{\text{math}}$ key).

10. Press $\boxed{\text{zoom}}$ 6 to select **6:ZStandard**. The graph screen displays automatically. The selected Y= function and the current values of the coefficients A, B, and, C display on the screen. The values of A, B, and C may be different on your calculator.
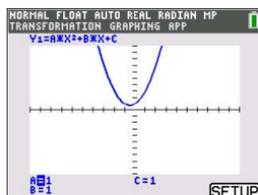
11. Press $\boxed{\blacktriangleright}$ to increment the value of **A** by the Step value (1) from **1** to **2**. The graph is redrawn automatically, showing the effect of increasing the coefficient of **X** by step size 1 as set in the SETTINGS ([SETUP]) menu.
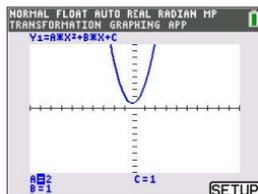
   If the coefficient **A** is not selected, press $\boxed{\blacktriangledown}$ until the = sign for A is highlighted.

12. Press $\boxed{\blacktriangledown}$ to highlight the = sign for **B**. Press $\boxed{\blacktriangleright}$ several times (pausing briefly each time as the graph is redrawn) to observe the effect of increasing the value of **B**.
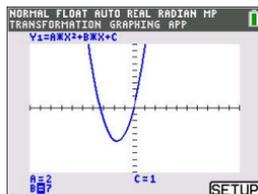
Tip: Press [SETUP] ([f5]) on the graph screen to display the SETTINGS menu.

Select TrailOn to leave a dotted graph each time you change or animate a coefficient. Default is TrailOff. TrailOff and TrailOn are also available in [2nd] [format].

The play > and play fast >> settings allow you to create animated slide show of the graph transforming by one selected parameter. The parameter values for A-D can be entered in SETTINGS as long as they are used in Y1 and/or Y2.

The Step value determines the increment of the parameter value. The Max value is the upper bound of the parameter expected in the animation.

Example: Y1=AX

In SETTINGS, let A=1, Step = 2, and Max = 10. Five screens will be created to animate the graph for A = 1, 3, 5, 7, 9. Note 9 < 10 = Max.

There can be up to 13 screens created for the animation. A memory error will be given if the Step and Max request more than 13 screens for the animation. To continue, press [window] and press [▲] to SETTINGS. Modify the Step or Max value to remain within the 13 screen limit.

Note: Enter a quadratic function in vertex form to graph in Y3. Try to match Y1 to the graph of Y3!

Menus and Function

Menus	Functions
Graph/Plot Setup Keys	
Y=	Displays the Y= Editor, where you can enter one or more function to graph and change the graph color and transformation play type.
	Press [◄] until the cursor is over the style column at the left of the Yn function. Press [enter]. Navigate to color or Transfrm style spinner menu. Press [◄] or [▶] on a spinner menu to select a color or Transfrm style. Select **OK** or **CLEAR** to accept or dismiss the changes.
Play-Pause (>II)	Controls which coefficient is changed and when the graph is plotted.
Play (>)	Stores a series of changes as pictures to display in a slide show format. The pictures play in a continuous loop until you stop them.
Play Fast (>>)	Stores a series of changes as pictures to display in a slide

Menus	Functions
	show format. The pictures play in a continuous loop until you stop them. It displays the pictures at a more rapid rate than Play (1).
Window	Set the viewing window to produce the best display of your graph.
Zoom	Quickly adjust the window to a pre-defined setting.
Trace	Move the cursor along the graphed function using ◁ and ▷.
Graph	Display the graph you have defined.

Error Messages

Error Message	Description
	.

General Information

Online Help

education.ti.com/eguide

Select your country for more product information.

Contact TI Support

education.ti.com/ti-cares

Select your country for technical and other support resources.

Service and Warranty Information

education.ti.com/warranty

Select your country for information about the length and terms of the warranty or about product service.

Limited Warranty. This warranty does not affect your statutory rights.