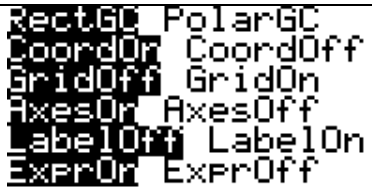
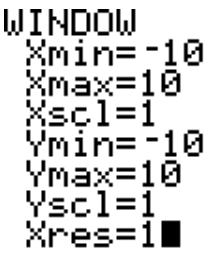
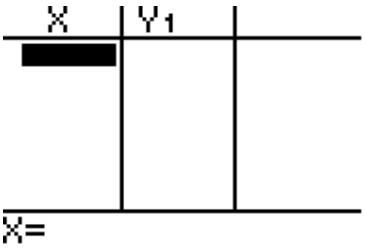
Guide for the TI-84 Graphing Calculator

To set the standard viewing window	[ZOOM] [6]:ZStandard
To repeat the previously entered data To repeat the answer from the previously entered data	[2^{ND}][ENTER] [2^{ND}][(–)]
To change a decimal to a fraction	decimal [MATH] [ENTER] [ENTER]
For absolute value	[MATH] → Num [1]:abs[(] value [)] [ENTER] On the screen: abs (
To raise a value to a (exponent power) For square, For other exponents,	value [X^2][ENTER] On the screen: value ^{2} value [^] exponent [ENTER]
For $\sqrt{\ }$ For $\sqrt[3]{\ }$	[2^{ND}][X^2] value [)] [ENTER] On the screen: $\sqrt{\ }$ ([MATH] [4]: $\sqrt[3]{\ }$ [( ] value [ )] [ENTER] or Value [^] [( ] [1] [÷] [3] [ )] On the screen: value ^ (1/3)
For base e Log base e Log base 10	[2^{ND}][LN] value [ )] [ENTER] On the screen: e^([LN] argument [ )] [ENTER] [LOG] argument [ )] [ENTER]
To enter a rational expression	[( ] numerator[ )] [÷] [( ] denominator [ )] [ENTER]
For a Negative number, use To Subtract, use the Minus sign	[(-)] [–]
To Quit	[2^{ND}][MODE]

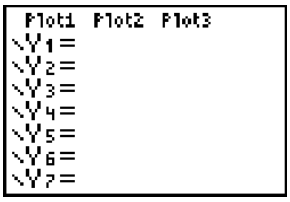
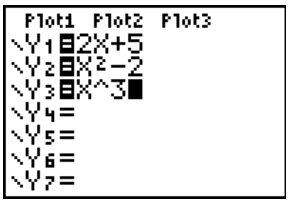
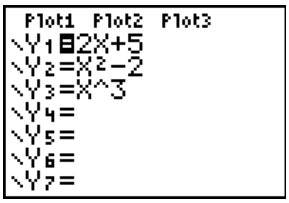
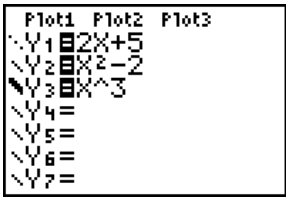
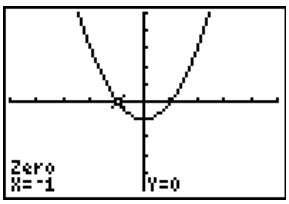
Guide for the TI-84 Graphing Calculator

To find zeros of a function	[Y=] equation [2ND][TRACE] (CALC) [2]:zero Use the left and right arrows to: Move the cursor to the left of the point [ENTER] Move the cursor to the right of the point [ENTER] [ENTER] The word Zero, the x value and y = 0 will appear at the bottom of the screen.
To find a maximum or minimum point	[Y=] equation [2ND] [TRACE] (CALC) [3]:minimum or [4]:maximum Use the left and right arrows to: Move the cursor to the left of the point [ENTER] Move the cursor to the right of the point [ENTER] [ENTER] The word Maximum or Minimum and the point will appear at the bottom of the screen.
For a list of factors	[Y=] product [÷] [X,T,Θ,n] [2ND][GRAPH] (Table) On the screen: y_1= product / x

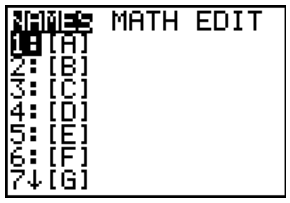
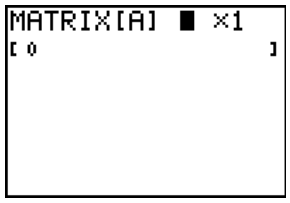
Standard Settings

[MODE] All items on the left side should be highlighted as shown.	
FORMAT ([2ND][ZOOM]) All items on the left side should be highlighted as shown.	
[WINDOW] The standard viewing window is shown. To change the viewing window, press [WINDOW], enter the new values. Xscl and Yscl represent the scale for the axes, i.e. the number of units between tick marks.	
TABLE ([2ND][GRAPH]) Use Table to see a list of values for a function entered in Y_1=. The up and down arrow keys can be used to scroll through the list.	
TBLSET ([2ND][WINDOW]) The standard table setup is shown. Use TBLSET to change the setting on the Table. TblStart= is the starting value of the Table. ΔTbl= is the increment of the x values. Indpnt: Auto automatically generates x and y values. Indpnt: Ask calculates y values for x values entered.	

Graphing Functions

1. Open the Y = editor by pressing [Y =].	
2. **Graph** the following equations: Use the [X,T,Θ,n] button for the X variable. $Y_1 = 2x + 5$ $Y_2 = x^2 - 2$ $Y_3 = x^3$ Press [GRAPH] to see the three equations plotted.	
3. Without deleting Y_2 and Y_3, graph just $Y_1 = 2x + 5$, by deselecting the other two. Scroll back to the equal sign of Y_2 and Y_3 and press [ENTER]. Press [GRAPH] to see the linear equation plotted.	
4. **To differentiate between the graphs**, different styles may be chosen. Press [Y =] , then move the cursor all the way to the left of the function to be changed. Press [ENTER] until the desired style appears. Repeat the process for each equation. Press [GRAPH] to see all three equations plotted.	
For locating zeros of an equation, use the [2nd][TRACE] (Calc) menu, choose [2]:zero. The calculator will ask for a left bound, a right bound, and a guess. Either use the scrolling capability to designate each or use the numeric keys. (The calculator will not be able to find zeros in this way if the function touches and turns at a particular zero since it looks for a sign change from left bound to right bound).	
For finding zeros without using the graph, use the TABLE ([2nd] [GRAPH]). TBLSET ([2nd] [WINDOW]) will allow the calculator to be set to ask for x-values before it calculates the corresponding y-values. Then select the table by [2nd] [GRAPH] and input x values in the x column.	

Entering Matrices

To enter a matrix, go to [2nd][x^{-1}] (MATRIX). There are three columns: NAMES, MATH, and EDIT. Arrow over to EDIT and arrow down to the name of the matrix to be entered.	
To enter the matrix $[A]=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$, arrow over to EDIT. Since [A] is already highlighted, press [ENTER].	
Type in the dimensions of the matrix, in this case it is 2 x 2. Enter the numbers. As the data is typed, press [ENTER]. The cursor will automatically advance to the next element until all the elements have been filled.	

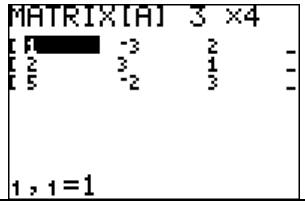
Using the ROWOPS Program

ROWOPS is a program that must be loaded onto the calculator. It is used to solve a system of linear equations using the Gauss-Jordan Elimination Method.

Enter an augmented matrix in MATRIX ([2nd][x^{-1}]) A, B, C, D or E before entering the program. Always completely exit the program when finished by selecting option 5:Quit to Main and then 6: Quit. "Done" will appear on the screen to indicate a successful exit. If a wrong number, row or column is entered incorrectly, quit the program and start over or enter the last correct matrix and continue. It is difficult to back up and undo an error. The matrix is not saved as it is changed. The [CLEAR} button should not be used while in the program.

Solve the following system of equations: $\begin{cases} x-3y+2z=-8 \\ 2x+3y+z=17 \\ 5x-2y+3z=5 \end{cases} \rightarrow \left[\begin{array}{cccc} 1 & -3 & 2 & -8 \\ 2 & 3 & 1 & 17 \\ 5 & -2 & 3 & 5 \end{array}\right]$

1. [2nd][x^{-1}] (MATRIX), select EDIT and enter the 3×4 augmented matrix (usually matrix [A]).

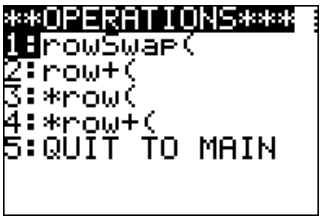


2. Go to[PRGM], choose ROWOPS, then press [ENTER].

3. Select the desired matrix.
(1: [A] for this example)

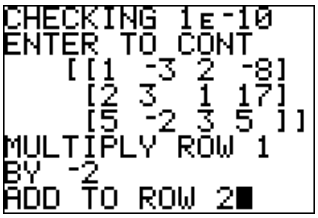
4. Choose from the operations in the menu:
Use option 3 to get a leading 1
(#3 multiply a row by a constant.)
Use option 4 to get zeros
(#4 multiply a row by a constant and add the row to another row)

With each operation, follow the prompts and press [ENTER] after each entry.

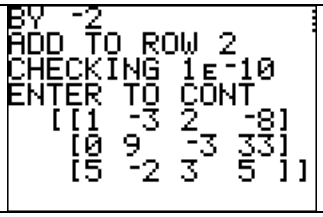
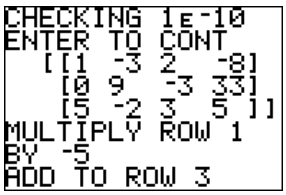
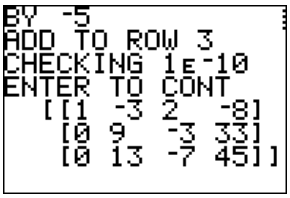
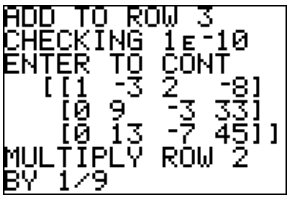
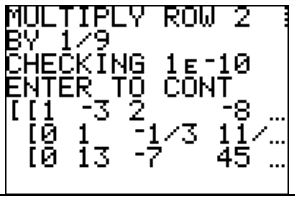
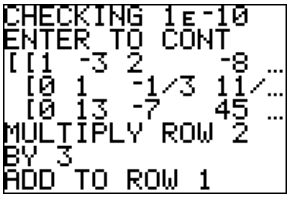


5. R1 C1 already has a 1. To get a zero in R2 C1 choose #4 from the operations menu.

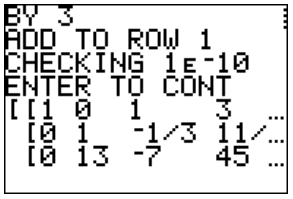
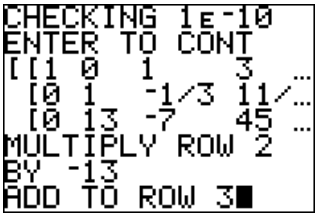
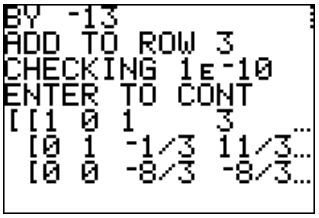
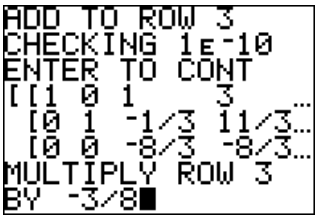
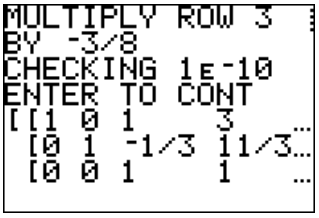
6. Multiply Row 1 by -2 and Add to Row 2
Proper Notation: $-2R_1 + R_2$



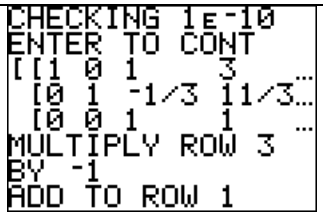
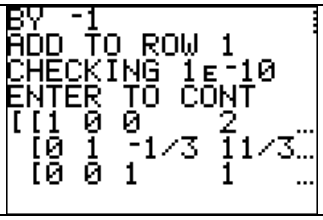
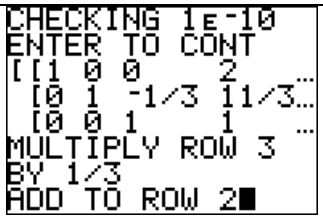
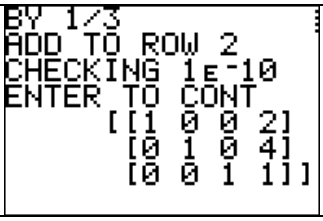
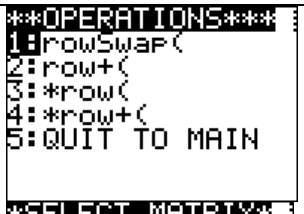
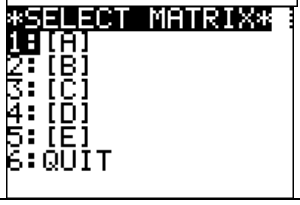
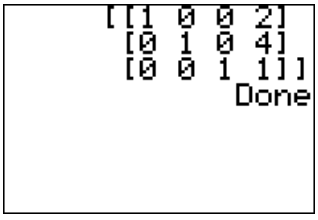
Using the ROWOPS Program (continued)

7. The following matrix will result:	
8. To get a zero in R3 C1, choose #4 from the operations menu.	
9. Multiply Row 1 by -5 and Add to Row 3 Proper Notation: $-5R_1 + R_3$	
10. The following matrix will result:	
11. To get a leading 1 in R2 C2, choose #3 from the operations menu.	
12. Multiply Row 2 by 1/9 Proper Notation: $1/9R_2$	
13. The following matrix will result: (arrow left and right to see the whole matrix)	
14. To get a zero in R1 C2, choose #4 from the operations menu.	
15. Multiply Row 2 by 3 and Add to Row 1 Proper Notation: $3R_2 + R_1$	

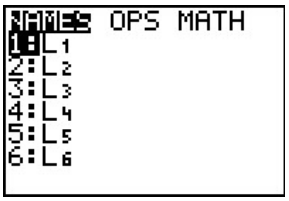
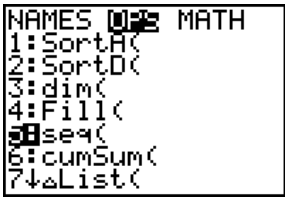
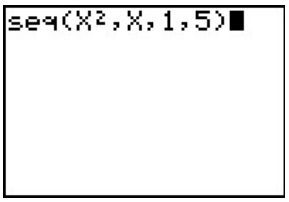
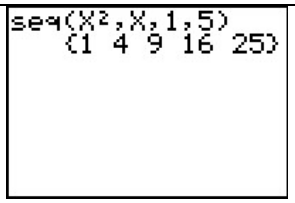
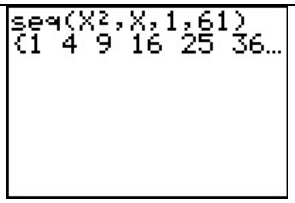
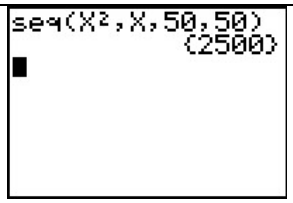
Using the ROWOPS Program (continued)

16. The following matrix will result: (arrow left and right to see the whole matrix)	
17. To get a zero in R3 C2, choose #4 from the operations menu.	
18. Multiply Row 2 by -13 and Add to Row 3 Proper Notation: $-13R_2 + R_3$	
19. The following matrix will result: (arrow left and right to see the whole matrix)	
20. To get a leading 1 in R3 C3, choose #3 from the operations menu.	
21. Multiply Row 3 by -3/8 Proper Notation: $-3/8R_3$	
22. The following matrix will result: (arrow left and right to see the whole matrix)	
23. To get a zero in R1 C3, choose #4 from the operations menu.	

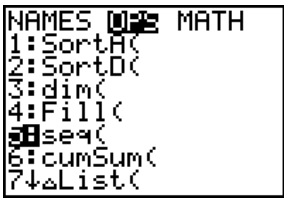
Using the ROWOPS Program (continued)

24. Multiply Row 3 by -1 and Add to Row 1 Proper Notation: $-1R_3 + R_1$	
25. The following matrix will result: (arrow left and right to see the whole matrix)	
26. To get a zero in R2 C3, choose #4 from the operations menu.	
27. Multiply Row 3 by 1/3 and Add to Row 2 Proper Notation: $1/3R_3 + R_2$	
28. The following matrix will result:	
29. The process is finished when there is an identity matrix on the left. State the solutions as: $x = 2$, $y = 4$, $z = 1$ or as the ordered triple (2, 4, 1)	
30. To exit the ROWOPS program, select [5]:Quit to Main from the operations menu, then select [6]:Quit to completely exit the program.	 
31. "Done" will appear on the calculator screen, to indicate a successful exit from the program.	

Specific Terms of a Sequence

You can use your calculator to evaluate a sequence of terms. As an example, the calculator will provide the first 5 terms of the sequence $a_n = n^2$ Press [2^{nd}][STAT] (LIST).	
Choose OPS and then [5]: seq (	
The screen will appear as shown.	
Provide the necessary information as follows: seq(expression, variable, begin, end[,increment]) Use X as the variable, and write the expression in terms of X instead of n, to make it easier to enter. Note that the increment is not necessary.	
Press [ENTER]. The first five terms of the sequence will appear in braces.	
If there are too many terms to be seen on one screen, scroll over using the left arrow to see the remaining terms.	
To find only one term of the sequence, such as the 50^{th} term, put the term number as the beginning and the end, and just that term will be shown.	

Sum of n Terms of a Sequence

Find $\sum_{k=1}^{10} 2k+3$ To get the sum of a sequence, press [2nd][STAT] (LIST) and choose [MATH] and then [5]: sum (	
The screen will appear as shown.	
Again, press [2nd][STAT] (LIST), choose OPS and then [5]: seq	
Provide the necessary information as follows: seq(expression, variable, begin, end[,increment]) Use X as the variable, and write the expression in terms of X instead of n, to make it easier to enter. Note that the increment is not necessary. Then, press [ENTER].