Algebra 2 TI-84 Tips & Tricks

- On the TI-84 all the blue functions above keys can be accessed by first clicking the blue 2^{nd} button and green functions above keys can be accessed by first clicking the green **alpha** button
- To make **Exponents** click the **^** (above the **÷** symbol). A shortcut for squaring is the **x^2** button above the **log** button on left side of calculator
- 2^{nd} and **mode** to Quit and return to the HomeScreen. Sometimes the **clear** button below the scroll arrows will also work.
- To make an Absolute Value symbol click the green **alpha** button then **window** button. Press **enter**. You should see **| |**

- **The Math button**
  Located under the green alpha button, it has several important functions you will be using in Algebra 2
  3: 3 will **cube** any number or variable (like x^3 or 4^3)
  4: $\sqrt[3]{}$**(** will take the third root
  5: $\sqrt[x]{\square}$ allows you to take any root
  0↓ summation $\sum$ **(** lets you calculate summations
  A↓ logBASE (lets you do logs with bases other than 10
  Scroll right to **NUM**
  1: abs(is the absolute value symbol
  9↓ gcd(helps you find greatest common denominator
  0↓ remainder(can tell you the remainder when one number divides into another. Very helpful when calculating the exponent on i

- **Making a fraction**
  To make a fraction press **alpha** and the key next to it **x,T,θ,n** or press **alpha** then **y=** then press **enter**. This is useful for reducing fractions (slopes must be reduced before putting into slope-intercept form y=mx+b). It is also extremely useful when trying to calculate very complicated equations like Example 1.

Example 1:

Monthly mortgage payments can be found using the formula below, where M is the monthly payment, P is the amount borrowed, r is the annual interest rate, and n is the total number of monthly payments.

$$M = \frac{P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{n}}{\left(1+\frac{r}{12}\right)^{n}-1}$$

If Adam takes out a 15-year mortgage, borrowing $240,000 at an annual interest rate of 4.5%, his monthly payment will be

1 $1379.09
2 $1604.80
3 $1835.98
4 $9011.94

- **Questions with One Variable and an equal sign**
  Take each side and put one into y_1= and the other into y_2=
  Then **graph** (if you cannot see the intersection, you may need to adjust the **window**. Instructions for that below)
  Click 2^{nd} **trace** then chose **5: intersect** and hit **enter**
  Use the scrolling arrows to move close to the intersection on **First curve** then click **enter**
  Now move close to the intersection on **Second Curve** and click **enter**
  Now the calculator says **Guess?** Hit **enter**.
  The calculator will say **Intersection** and displays the x and y values

Example 2:

What is the solution set for x in the equation below?

$$\sqrt{x+1}-1=x$$

1 $\{1\}$
2 $\{0\}$
3 $\{-1,0\}$
4 $\{0,1\}$

Example 3:

What is the solution set of the equation $\frac{2}{x} - \frac{3x}{x+3} = \frac{x}{x+3}$?

1 $\{3\}$

2 $\left\{\frac{3}{2}\right\}$

3 $\{-2, 3\}$

4 $\left\{-1, \frac{3}{2}\right\}$

- **Changing Windows in Graphing**
  Sometimes you will be given a question that involves graph that is outside the domain and range on the default graph (x and y both go from -10 to 10.)
  Click on **window**
  Xmin enter smallest x value
  Xmax enter largest x value
  Ymin enter smallest y value
  Ymax enter largest y value
  Then **Graph**
  Note: *to reset the graph back to the default click* **zoom, 6, enter**

- **Finding intersection with graphing**
  Isolate the y by moving all the x's and numbers to other side of equal sign
  Put these equations into y_1**=** and y_2**=**
  Click 2^{nd} **trace** then chose **5: intersect** and hit **enter**
  Use the scrolling arrows to move close to the intersection on **First curve** then click **enter**
  Now move close to the intersection on **Second Curve** and click **enter**
  Now the calculator says **Guess?** Hit **enter**.
  The calculator will say **Intersection** and displays the x and y values

Example 4:

$$y = x^2 - 3x - 6$$
$$y = x - 1$$

- **Finding intersection with table**
  Isolate the y by moving all the x's and numbers to other side of equal sign
  Put these equations into $\boldsymbol{y_1}$**=** and $\boldsymbol{y_2}$**=**
  Check the table $\boldsymbol{2^{nd}}$ **graph**
  For whatever value of x, both the $\boldsymbol{Y_1}$ and $\boldsymbol{Y_2}$ match, that will be the answer
  Try it with Example 4 above. When x=-1, the $\boldsymbol{Y_1}$ and $\boldsymbol{Y_2}$ are both -2 so the point (-1,-2) is one intersection. When x=5, the $\boldsymbol{Y_1}$ and $\boldsymbol{Y_2}$ are both 4 so (5,4) is another intersection.

  Note*: If two equations have the same number in front of the x (slope) and different y-intersects, they will be parallel so there will be* ***no solution*** *because parallel lines never intersect.*

- **Questions with One variable**
  Put the question in $\boldsymbol{y_1}$**=**
  Put each answer one by one in $\boldsymbol{y_2}$**=**
  Check the table $\boldsymbol{2^{nd}}$ **graph**
  If all the values in the $\boldsymbol{Y_1}$ and $\boldsymbol{Y_2}$ match, the answer is correct

  Example 5:

When the expression $(x+2)^2 + 4(x+2) + 3$ is rewritten as the product of two binomials, the result is

1 $(x+3)(x+1)$
2 $(x+5)(x+3)$
3 $(x+2)(x+2)$
4 $(x+6)(x+1)$

Example 6:

The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to

1 $-\sqrt[6]{m^5}$

2 $\frac{1}{\sqrt[6]{m^5}}$

3 $-m\sqrt[5]{m}$

4 $\frac{1}{m\sqrt[5]{m}}$

Example 7:

The expression $\frac{-3x^2-5x+2}{x^3+2x^2}$ can be rewritten as

1 $\frac{-3x-3}{x^2+2x}$

2 $\frac{-3x-1}{x^2}$

3 $-3x^{-1}+1$

4 $-3x^{-1}+x^{-2}$

You can also check your factoring using this method. Put the question in y_1=. In y_2= enter what you got when you factored.
Check the table 2^{nd} **graph**
If all the values in the Y_1 and Y_2 match, the answer is correct

Example 8:

Over the set of integers, factor the expression
x^4-4x^2-12.

- **Using y= to Help with Common Bases**
  In Algebra 2, you will be expected to know perfect squares. If you do not know them all, go to **y=** and enter **x^2** then **2^{nd} graph.** You will see a table. In the **Y column** are the perfect squares. In the **X column** are the numbers you get when you square the perfect square.

  You are also expected to know the values of base 2, 3, 4, 5, 6, 7 etc. If you do not know for example that 2^4 is 16, you can go to **y=** enter **2^x** then **2^{nd} graph.** In the table you would scroll down the x's until you see 4, next to it in the **Y column** is 16. You can use this method to find bases of by entering 3^x, bases of 4 by entering 4^x, etc.

- **Finding Solutions, Roots, Zeroes, and X-Intercepts**
  Solutions, roots, zeroes, and x-intercepts all mean the same thing: they want you to find where a function crosses the x-axis (where y is zero hence why it is called "zeroes".)
  Isolate the y by moving all the x's and numbers to other side of equal sign
  Put the equation into **y_1=**
  Click **2^{nd} trace** then chose **2: zero** and hit **enter**
  Move the cursor to the **left** (above) of the place where it crosses the x-axis **Left Bound** and hit **enter.** Move cursor to the **right** (below), hit **enter**. Calculator asks **Guess?** Hit **enter.** Below the graph, the display will show the x and y coordinates. ***The Y should be 0.***

  Example 9:
  The zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are
  1 $\{0, \pm 3, 4\}$
  2 $\{0, 3, 4\}$
  3 $\{0, \pm 3, -4\}$
  4 $\{0, 3, -4\}$

- **Finding Minimums and Maximums**
  Put the equation into **y_1=**
  Click **2^{nd} trace** then choose either **3: minimum** (for lowest point) or **4: maximum** (for highest point) then hit **enter**

The graph appears, move the cursor **Left Bound**, **enter**, **Right Bound**, **enter.** Calculator asks **Guess?** Hit **enter.** Below the graph, the display will show the x and y coordinates.

Example 10:

What is the *minimum* value of the function $y = |x + 3| - 2$?

1) -2
2) 2
3) 3
4) -3

Example 11:

Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

- **Statistics**
  Click on **stat** then **1: Edit** and **enter**
  You will enter each value under **L1** column and hit enter after each value
  Click on **stat** then Scroll to **Calc** and select **1: 1-Var Stats**
  List should have L1 next to it
  FreqList should have nothing next to it
  Scroll to **Calculate** and hit **enter**
  $\bar{x}$ is the mean (average)
  S_x is Sample standard deviation
  σ_x is Population standard deviation
  n= is the number of data points. (Make sure that matches how many were in the question.)
  minx= is the smallest value
  Q_1 is the lower quartile
  $\mathbf{Med}$ is the median
  Q_3 is the upper quartile
  $\mathbf{maxX}$ is the highest value

Example 13:

The following table shows the heights, in inches, of the players on the opening-night roster of the 2015-2016 New York Knicks.

84	80	87	75	77	79	80	74	76	80	80	82	82

The population standard deviation of these data is approximately

1) 3.5
2) 13
3) 79.7
4) 80

***Note:** To clear the values in the L1 column, scroll up so your cursor is on **L1**, hit **clear**, scroll down. That should clear all the data points.*

- **Correlation Coefficients**

*****The correlation coefficient will not appear unless you turn Stat Diagnostics On
Click **mode**
Scroll down to **Stat Diagnostics**
Scroll to **On** then hit **enter**
Then **Clear**

To enter data from a question, go to **stat**, **1: Edit**, **enter**
Enter all the x values under the **L1** column and the y values under **L2**
(If you are unsure, time is always an x value.)
Click on **stat**, scroll to **Calc**. Under **Calc**, scroll down to **0↓ ExpReg**, hit **enter.** You should see **Xlist: L1, YList: L2**, and nothing next to the rest. Scroll down click **Calculate** and **enter**
The Correlation Coefficient is the **r** value (ignore $\mathbf{r^2}$)

Example 14:

A cup of coffee is left out on a countertop to cool. The table below represents the temperature, $F(t)$, in degrees Fahrenheit, of the coffee after it is left out for t minutes.

t	0	5	10	15	20	25
F(t)	180	144	120	104	93.3	86.2

Based on these data, write an exponential regression equation, $F(t)$, to model the temperature of the coffee. Round all values to the *nearest thousandth*.

- **Normal Distribution**
  You will be asked to find the percent of a sample or population with certain information provided (mean, standard deviation, range of values)
  Click **2nd** and **vars** (right under the scroll arrows)
  Choose **2: normalcdf (**
  Enter the values for **lower:**, **upper:**, μ**:** (which is the symbol for mean), and σ: (which is the symbol for standard deviation)
  Scroll to **Paste** and hit **enter**
  The calculator should give you a decimal between 0 and 1
  If the question asks for a percent, you will need to multiply by 100 to convert a decimal to a percent

  Example 15:

  The heights of women in the United States are normally distributed with a mean of 64 inches and a standard deviation of 2.75 inches. The percent of women whose heights are between 64 and 69.5 inches, to the *nearest whole percent*, is

  1 6
  2 48
  3 68
  4 95

- **Solving systems of equations using The Matrix**
  2nd x^{-1} This will take you into the Matrix
  Click on **1** and scroll to **Edit**
  Put in the number of rows x columns then **Enter**
  Now you are in the Matrix. Enter each number from the coefficients in the equations, hit enter each time until all the rows and columns are filled
  2nd Mode (Quit the Matrix)
  2nd x^{-1} to reenter the Matrix
  Scroll to **Math**, then scroll down to **rref(**
  Hit **enter**
  2nd x^{-1} to reenter the Matrix
  Select the Matrix you were working on (for example 1**: [A])**
  Enter

Now you will see **rref([A]**
Enter

You will see a matrix like this one:

1	0	0	-2
0	1	0	4
0	0	1	-3

The first column is x, the second y, and the third is z. This matrix tells us that 1x=-2, 1y=4, and 1z=-3.

Example 16:

Consider the system of equations below?

$$x + 2y - z = 1$$

$$-x - 3y + 2z = 0$$

$$2x - 4y + z = 10$$

What is the solution to the given system of equations?

1 $(1,1,2)$
2 $(3,-1,0)$
3 $(5,-1,2)$
4 $(3,5,8)$