Basic Graphing Functions for the TI-83 and TI-84

The primary benefits of the TI-83 and TI-84 are the abilities to graph functions and to identify properties those functions possess. The purpose of this guide is to help you through some of the basic operations that can be done involving graphs: finding the y-intercept, zeroes (x-intercepts), and minimum/maximum points on a graph. Within this guide you will notice some words that are bold and put within quotes like "**this**". These words denote keys on your calculator or words that appear on its screen.
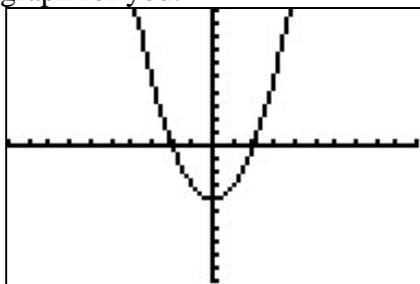
Graphing
The first step in any graphing problem is to draw the graph. On the TI-83 and TI-84, this is done by going to the function screen by pressing the "**Y=**" button and entering the function into one of the lines.
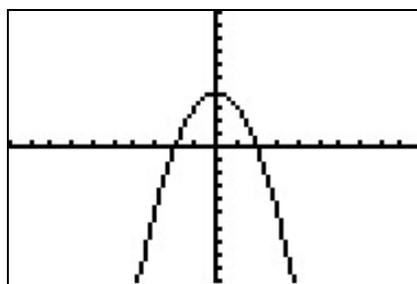

After the function has been entered, press the "**GRAPH**" button, and the calculator will draw the graph for you.

$$y = x^2 - 4 \qquad\qquad y = -x^2 + 4$$

Finding the y-intercept of a graph
The y-intercept of a graph is the point where the graph crosses the y-axis. Because of the way graphs like these are set up, any and all points that lie on the y-axis have x-values of 0. Because of that, we can use the "**value**" function on the calculator to find the y-intercept of any graph.
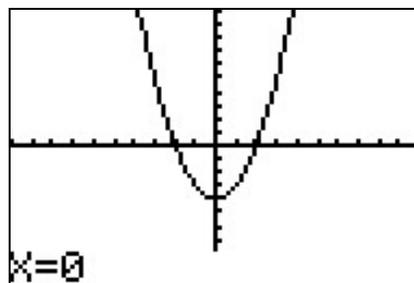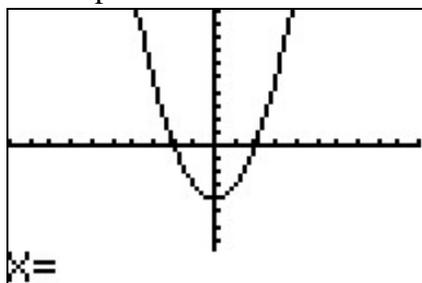
After entering the graph into the calculator, press "**2nd**" then "**TRACE**" to go to the "**CALCULATE**" window and highlight "**value**". Then press "**ENTER**".
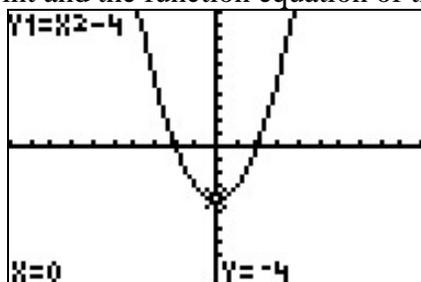
```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```

This will take you to the graph with "X=" displayed at the bottom of the screen. Type in "0" and then press "ENTER".


```
X=
```



```
X=0
```

The graph will now display a cursor where the y-intercept is located, along with the x- and y-coordinates of that point and the function equation of the graph selected.


```
Y1=X²-4


X=0          Y=-4
```

<u>**Finding the zeroes of a graph**</u>

The zeroes of a graph are the points where the graph crosses the x-axis, where y is always equal to 0. The idea of a zero is similar to that of the y-intercept, but the method used to identify the zero points is different because we cannot simply enter "Y=0" into the calculator and have it return the corresponding x-value.

After entering the graph into the calculator, press "2nd" then "TRACE" to go to the "CALCULATE" window and highlight "zero". Then press "ENTER".

```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```

This will take you to the graph, but instead of prompting a number, the calculator asks you to identify the "Left Bound". This is simply some point on the graph that is to the left

of the point that you want to identify. Use the left or right arrow keys to move the cursor along the graph until it is to the left of the point you want to identify. Then press "ENTER".
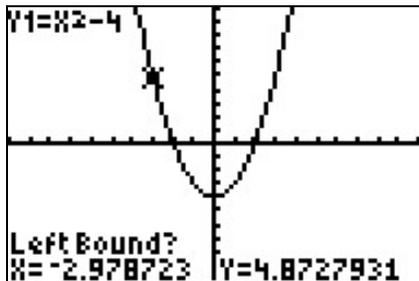

You will now see a little arrow above the point you marked pointing to the right, and that the calculator is now asking for the "Right Bound". The arrow is an indicator that will be used to tell if you entered valid points. The "Right Bound" is a point to the right of the point you wish to identify. Use the right arrow key to move the cursor along the graph until it is to the right of the point you want to identify. Then press "ENTER".
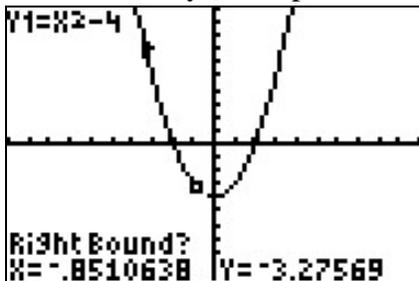

Now there should be two arrows on screen. If you entered the points correctly, the arrows should be pointing towards each other. If they are not, you will receive an error message after this next step and will need to redo the "zero" function.

The calculator should now be asking you to "Guess". Use the left arrow key to move the cursor along the graph until it is as close as possible to the point you want to identify. Then press "ENTER".
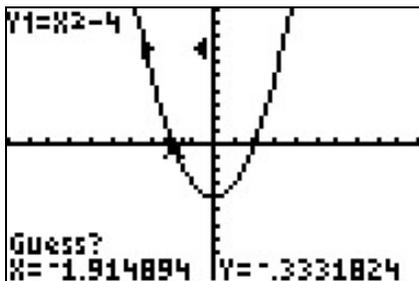
After this, the calculator should show the coordinates of the zero you have located along with a cursor over the location of the zero on the graph selected.
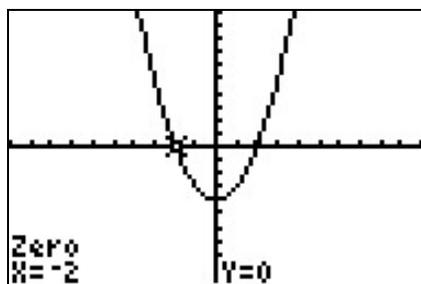
If there are multiple zeroes in your graph, repeat the process for each one until all zeroes are identified.

Finding the minimum/maximum of a graph

The minimum of a graph is the point with the lowest y-value for that graph. The maximum is the point with the highest y-value. The process for identifying these points is very much like that used to identify the zeroes, but remember that the "minimum" and "maximum" functions will not find the same thing as the "zero" function for most graphs. Because of this similarity this guide will only cover the "minimum" function in detail.

After entering the graph into the calculator, press "2nd" then "TRACE" to go to the "CALCULATE" window and highlight "minimum". Then press "ENTER".
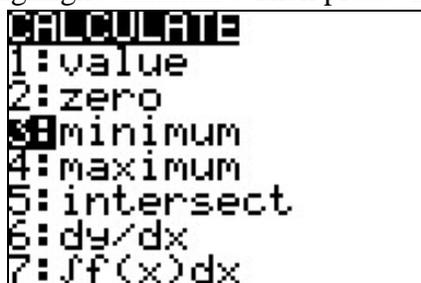
Use the left or right arrow keys to move the cursor along the graph to the left of the minimum and identify the "Left Bound" by pressing "ENTER".
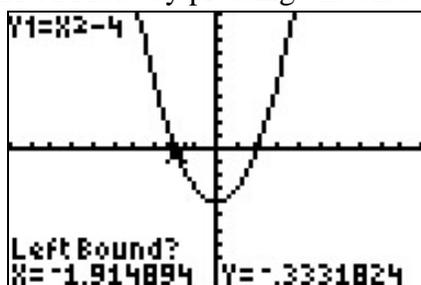

You will see a little arrow above the point you marked pointing to the right. Use the right arrow key to move the cursor along the graph to the right of the minimum and identify the "Right Bound" by pressing "ENTER".
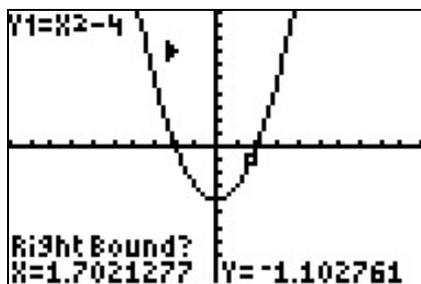
Now there should be two arrows on screen. If you entered the points correctly, the arrows should be pointing towards each other. If they are not, you will receive an error message after this next step and will need to redo the "**minimum**" function.

Use the left arrow key to move the cursor along the graph until it is as close as possible to the point you want to use to "**Guess**". Then press "**ENTER**".
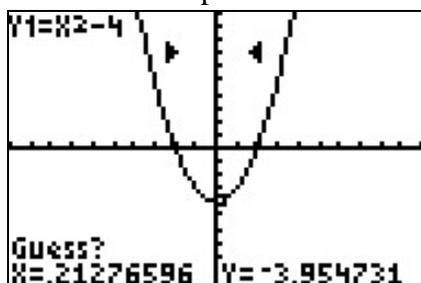
After this, the calculator should show the coordinates of the minimum along with a cursor over the location of the minimum on the graph selected.
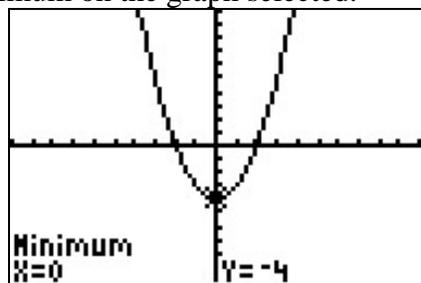
Finding the maximum works in a similar manner to finding the minimum, with the only significant differences being the menu selection and the end result.
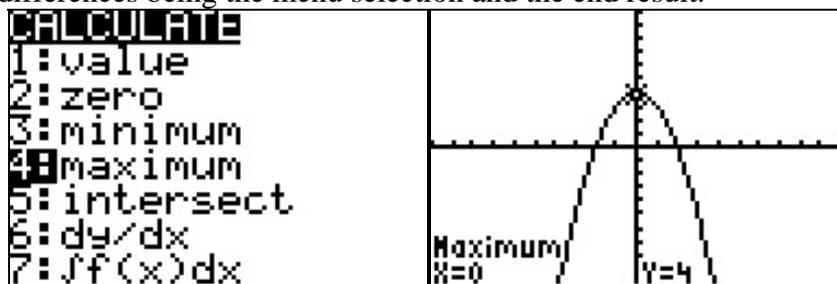
Some graphs may contain either a minimum or a maximum or local regions which possess relative maximums or relative minimums without being the true maximum or true minimum for that graph. In those cases, you may need to use a combination of these two functions or use one or both functions more than once to identify all such points.