

Graphing and Evaluating a Function

GRAPHING A FUNCTION

Step 1. You first need to define your function. Hit the **Y =** button to display the equation editor.

```
Plot1 Plot2 Plot3
Y1=
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Step 2. Enter your function on a blank line. If you need to erase an old function, just press **CLEAR**. Use the **x,T,θ,n** button for x (or any independent variable). Press **ENTER**.

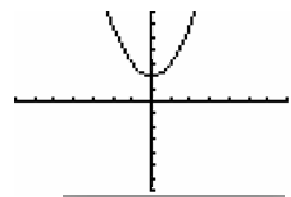
```
Plot1 Plot2 Plot3
Y1=X^2+2
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Example: $y = x^2 + 2$

Step 3. Set an appropriate viewing window. You can do this manually by pushing the **WINDOW** button.

```
WINDOW
Xmin=-7
Xmax=7
Xscl=1
Ymin=-7
Ymax=7
Yscl=1
Xres=1
```

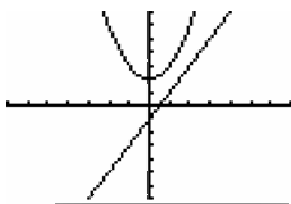
Step 4. To display the graph of your function, hit the **GRAPH** button.



Note: You may graph more than one function at a time. You need only define the second function in the equation editor by pressing the **y =** button and typing the second equation on a different line. For example, $y = 2x - 1$

```
Plot1 Plot2 Plot3
Y1=X^2+2
Y2=2X-1
Y3=
Y4=
Y5=
Y6=
Y7=
```

Then, adjust your window as needed by pressing the **WINDOW** button, changing the values (if desired) and then **GRAPH**.



EVALUATING A FUNCTION

You can **evaluate a function** on the calculator as well. There are a several methods to do this. Below are three methods:

1. Use function notation
2. Calc menu, #1 value
3. Using the table feature

Method 1: Using Function Notation

Example: Given that $f(x) = 3x^2 + 1$, find $f(1), f(-3), f(.15)$.

Note: This method will ALWAYS work regardless of your window. It is also very quick.

Define Your Function: First make sure that your function is defined in $y=$ menu. Press the $Y=$ Button and enter the function on a blank line.

```
Plot1 Plot2 Plot3
Y1=3X^2+1
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Hint: Be sure to remember where you entered the function. This will be the name of your function!! (Y_1, Y_2 , etc...)

Go to the Calculator Screen: Go to the calculator screen by pressing 2^{nd} and $MODE$, which is "quit". You are now in calculator mode.

```
VARs Y-VARS
1:Window...
2:Zoom...
3:GDB...
4:Picture...
5:Statistics...
6:Table...
7:String...
```

Finding the value of a function: To find $f(1)$ we simply need to type in " $f(1)$ " into our calculator. However our calculator isn't calling our function f , instead its calling our function Y_1 . So, we need to type in " $Y_1(1)$ ". To do this press:

```
VARs Y-VARS
1:Function...
2:Parametric...
3:Polar...
4:On/Off...
```

$VARs$
right arrow to $Y-VARS$
choose $1: Function$
 $1:Y_1$
 (1)
and $ENTER$

```
FUNCTION
1:Y1
2:Y2
3:Y3
4:Y4
5:Y5
6:Y6
7:Y7
```

Repeat this process for $f(-3)$ and $f(.15)$. This would be $Y_1(-3)$ and $Y_1(.15)$.

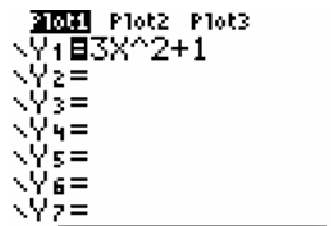
```
Y1(1)          4
Y1(-3)         28
Y1(.15)        1.0675
```

Method 2: Using the Value Feature

Example: Given that $f(x) = 3x^2 + 1$, find $f(1), f(-3), f(.15)$.

Note: In order for this method to work you must have your window set so the x-value is in your window. If your x-value is not in the window then you will get an "INVALID" error message.

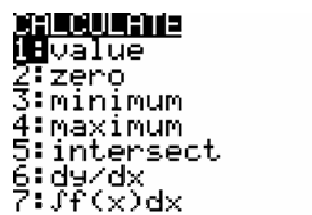
Define Your Function: First make sure that your function is defined in $y=$ menu. Press the $Y=$ Button and enter the function on a blank line.



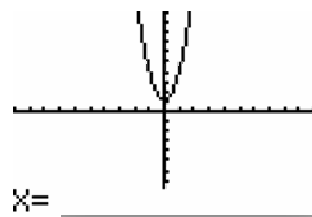
Hint: Be sure to remember where you entered the function. This will be the name of your function!! (Y₁, Y₂, etc...)

Check your Window: Check your window to make sure that $x=1, -3,$ and $.15$ are values that are within the viewing window. If $x=1, -3,$ and $.15$ are not values shown in the viewing window, you will receive an error when you try to evaluate. Adjust your minimum and maximum values if necessary.

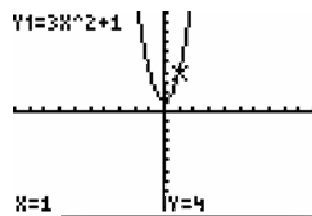
Then hit 2^{nd} Trace and chose option #1 Value.



You will see your graph with an $x =$ at the bottom. Enter the value of $x=1$ and the calculator will show you the corresponding y value.



Do the same for $x = -3$ and $x = .15$ to find their corresponding y values as well.

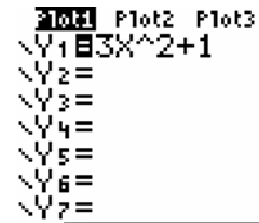


Method 3: Using a table

Example: Given that $f(x) = 3x^2 + 1$, find $f(1), f(-3), f(15)$.

1. **Define Your Function:** Press the **Y=** Button and enter the function on a blank line.

Hint: Be sure to remember where you entered the function. This will be the name of your function!! (Y_1, Y_2 , etc...)



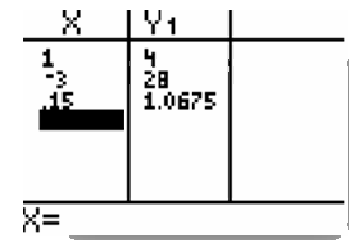
```
Plot1 Plot2 Plot3
Y1=3X^2+1
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

2. **Setting up a table:** To display the table set-up screen, press the **2nd** button and then the **Window** button. Be sure that you choose **ASK** for the independent variable and **Auto** for the Dependent variable.



```
TABLE SETUP
TblStart=1
ΔTbl=1
Indent: Auto
Depend: Auto
```

3. **Finding the value of a function:** To display your table, press the **2nd** button and then the **Graph** button. Enter the value of the independent variable (X) and press **ENTER**. The value of the function will be displayed in the Y_1 column.



X	Y1
1	4
-3	28
15	1.0675

X=

So $f(1) = 4, f(-3) = 28, \text{ and } f(15) = 1.0675$