

# MATH 1311

Section 2.2

# Graphs

## **Graphing with the calculator**

Step 1: Enter the function or functions in the Y= menu.

Step 2: Selecting the Viewing Window:

Step 3: Viewing the Graph:

Step 4: Tracing the Graph and finding the function value for a particular X value.

**Example 1:** Graph the function  $f(x) = x^2 - 2$

Step 1: Enter the function in the Y = menu.



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

Step 2: Set the Graphing Window in the

Window menu.



```
WINDOW
Xmin=-5
Xmax=5
Xscl=1
Ymin=-2
Ymax=25
Yscl=2
Xres=1
```

The Xmin is the left side of the x-axis.

The Xmax is the right side of the x-axis.

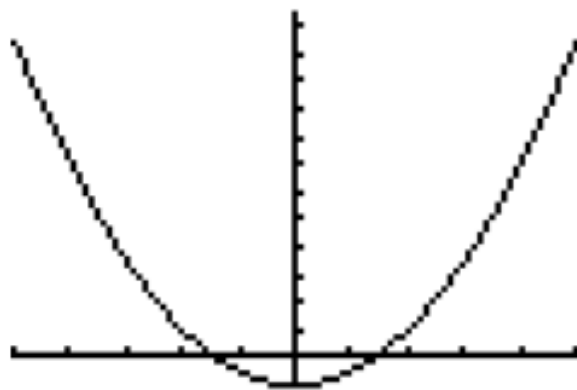
The Xscl is how far apart the tick marks are on the x-axis.

The Ymin and Ymax are the smallest and largest y values on the y-axis.

The Yscl is how far apart the tick marks are on the y-axis.

The Xres leave at 1.

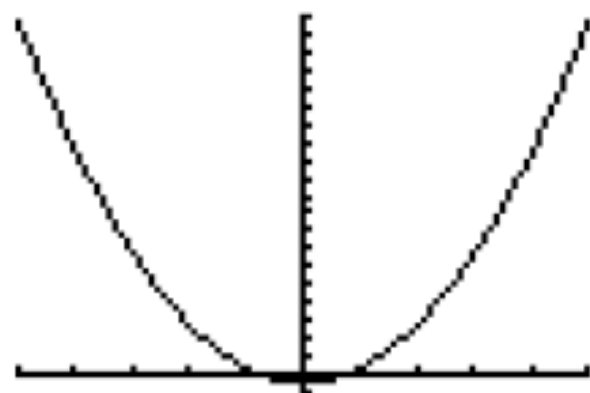
Step 3: Graph – here is what it looks like when I hit graph with the settings above.



Let me change the window settings.

```
WINDOW  
Xmin=-10  
Xmax=10  
Xscl=2  
Ymin=-5  
Ymax=100  
Yscl=5  
Xres=1
```

Here is what it looks like now:

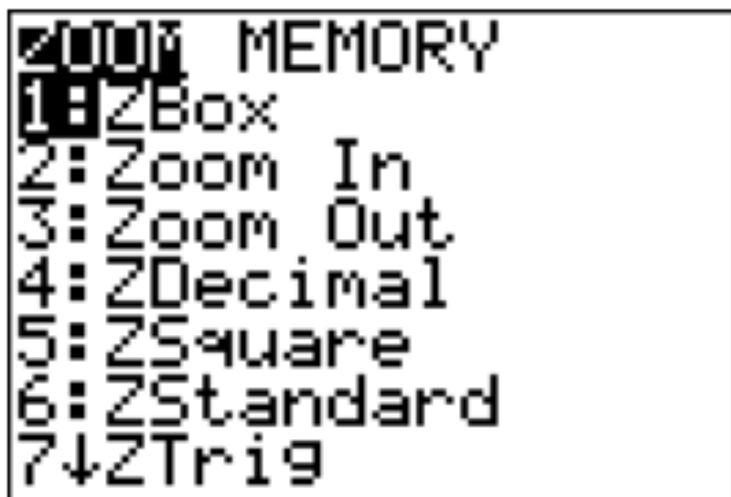


Sometimes using Zoom option works better.

Alternative Step 2: Press



and enter the minimum and maximum input values (Xmin and Xmax).




Alternative Step 3: Now press



to see the graph.

#### Step 4: Reading Values from the Graph

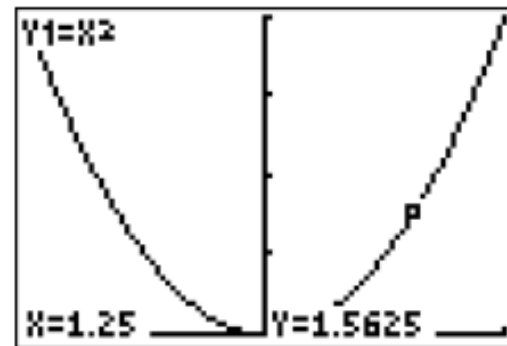
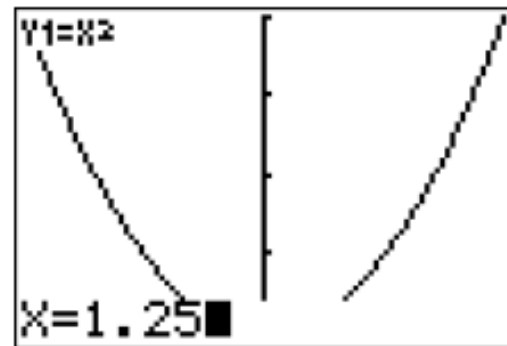
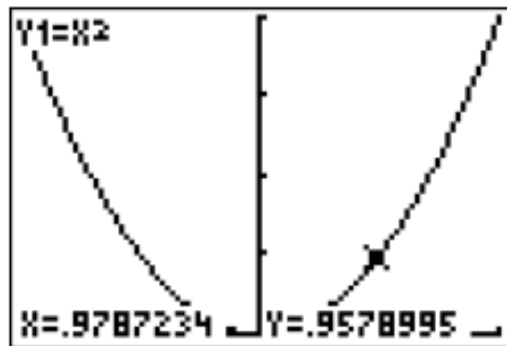
While looking at the graph, we can press , then using the left and right arrows, we can read values on the graph.

While tracing, if we enter any number (between  $X_{\min}$  and  $X_{\max}$ ) and then press , we will see the function's value for that value of  $x$ .



**Example 2:** Find  $f(1.25)$  for  $f(x) = x^2$ .

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**Example 3:** Graph the function  $f(x) = 2^x - x^2$ .

- a. Find a good window to view the piece from  $x = 0$  to  $x = 5$ .
- b. Find  $f(2)$ .
- c. Find  $f(3.4)$ .

**Example 4:** The yearly profit from the sale of  $n$  thousand widgets is

$$P(n) = -180 + 100n - 4n^2 \text{ million dollars.}$$

- a. Sketch a graph of this function showing values of  $n$  between 0 and 20.

b. Calculate  $P(0)$  and explain in practical terms what your answer means.

c. What profit will the producer make if 15 thousand widgets are sold?

d. The break-even point is the point at which the profit is zero. Use the graph to estimate the break-even point.

e. What is the largest profit possible?

**Example 5:** The monthly payment on \$120000 borrowed at 6% compounded continuously if the loan is for  $x$  years is  $M(x) = \frac{120000(e^{0.005}-1)}{1-e^{-0.06x}}$ . Loans of this amount are typically 10 to 30 years in length. Sketch the graph of this function, and while looking at the graph, determine the monthly payment if the money is borrowed for 15 years.

**Example 6:** A potato is placed in a preheated oven to bake. Its temperature  $F$  as a function of time  $t$  is given by  $F(t) = 400 - 325e^{-t/50}$ . Where  $F$  is measured in degrees Fahrenheit and  $t$  is time in minutes since the potato was placed in the oven.

Graph  $F(t)$ .

1. What is the initial temperature of the potato?





4. The potato will be done when it reaches a temperature of 270 degrees. Estimate when it will be done.
5. What is the temperature of the oven?

Use the table below to determine if there is a limiting value for this function. If so, what is the limiting value?

$x$	$N(x)$
1	3
2	$3 + \frac{1}{2}$
3	$3 + \frac{2}{3}$
4	$3 + \frac{3}{4}$
5	$3 + \frac{4}{5}$
$n$	$3 + \frac{n-1}{n}$

Use the table below to determine if there is a limiting value for this function. If so, what is the limiting value?

$x$	$N(x)$
1	2
2	$2\frac{1}{2}$
3	$3\frac{1}{3}$
4	$4\frac{1}{4}$
5	$5\frac{1}{5}$
$n$	$n + \frac{1}{n}$