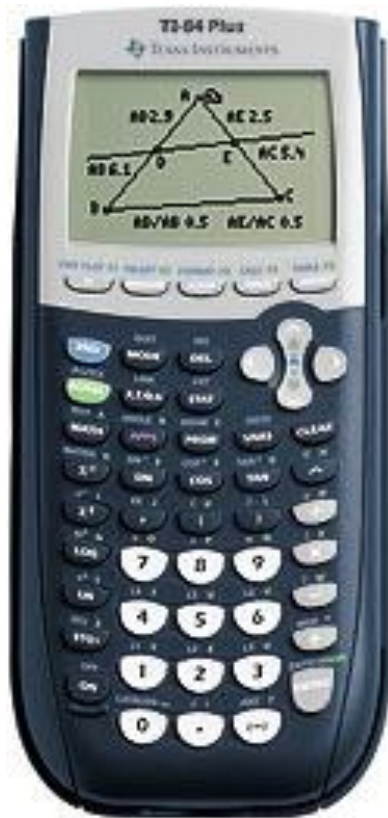


SILVER SPRING INTERNATIONAL MIDDLE SCHOOL



GRAPHING CALCULATOR REFERENCE BOOK



Name: _____

Teacher: _____

Graphing Linear Equations

To Graph an Equation:

- 1.) Press **Y=** and enter the equation into **Y₁**

```

Plot1 Plot2 Plot3
Y1=.5X+3
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=

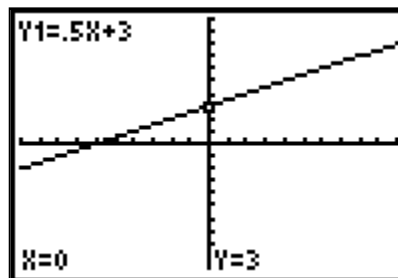
```

- 2.) To see the graph in a standard screen (10 x 10), press **ZOOM** and select **6:Zstandard**. Use **TRACE** to see the solutions on the bottom of the screen. **TRACE** will automatically show the y-intercept.

```

ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7:ZTrig

```



- 3.) To adjust the window manually, press **WINDOW** and change the settings.

```

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1

```

To View the X/Y Table of a Graph:

- 1.) Press **2nd** **GRAPH** to see the table that corresponds to the equation in the **Y=** screen.

X	Y1	
3	4.5	
4	5.5	
5	6.5	
6	7.5	

X=3

- 2.) Use the blue arrow keys to scroll up and down the **X** column. If the values in the **Y** column are in scientific notation, highlight the value of the cursor and the actual value will be shown at the bottom of the screen.
- 3.) To set the table, press **2nd** **WINDOW** for the **TABLE SETUP** menu.

TblStart – where the table will begin according to the x-value.

ΔTbl – the scale of the x-values.

Indpnt – If set on Ask, you can enter specific x-values to get the corresponding y-value.

Depend – If set on Ask, you can select the y-values to be shown by highlighting and selecting the values.

TABLE SETUP		
TblStart=3		
ΔTbl=1		
Indpnt:	Auto	Ask
Depend:	Auto	Ask

X	Y1	
3	4.5	
4	5	

X=8

X	Y1	
3	4.5	
4	5	
5	6.5	

Y1=6.5

Graphing Systems of Equations

To Graph a System of Equations:

- 1.) Press **Y=** and enter the equations into **Y₁** and **Y₂**.

```

Plot1 Plot2 Plot3
\Y1=(1/2)X+5
\Y2=-3X-2
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=

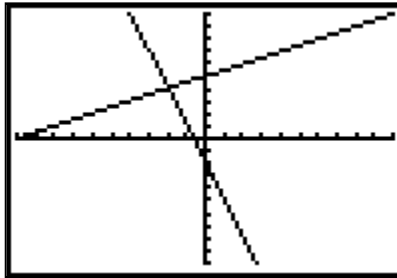
```

- 2.) To see the graph in a standard screen (10 x 10), press **ZOOM** and select **6:Zstandard**.

```

ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig

```



- 3.) To adjust the window manually, press **WINDOW** and change the settings.

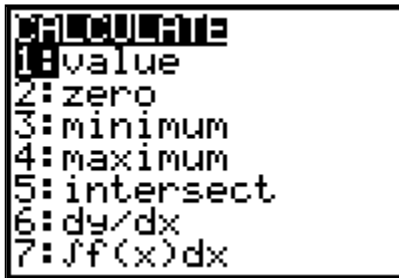
```

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1

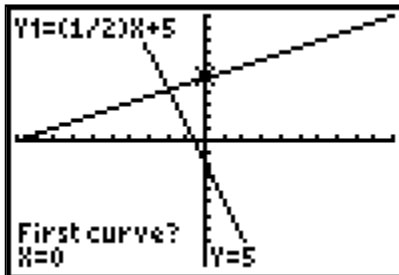
```

To Find the Solution to a System of Equations:

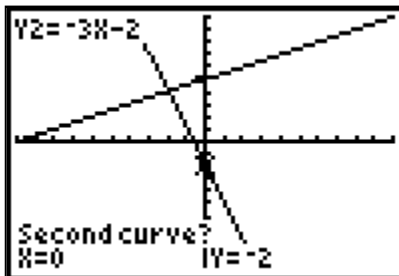
- 1.) Press **2nd** **TRACE** for the Calculate Menu and select **5:Intersect** and press **ENTER**.



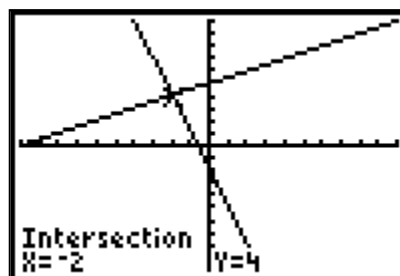
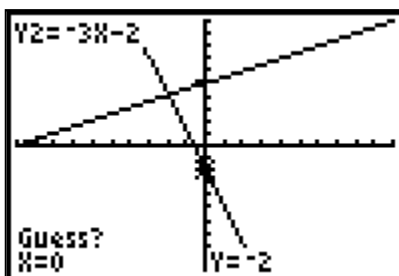
- 2.) The calculator will automatically place the cursor on the first equation. You will see **Y1** in the upper left corner. Press **ENTER**.



- 3.) The calculator will automatically move the cursor to the second equation. You will see **Y2** in the upper left corner. Press **ENTER**.



- 4.) Hit **ENTER** one more time and the solution will be displayed at the bottom of the screen.



To Sort a List of Data (find the Mode):

- 1.) From the home screen, press **STAT** and arrow down to **SortA(** (ascending) or **SortD(** (descending) and press **ENTER**.

```

2001 CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor

```

- 2.) The calculator is now waiting for you to tell it which list to sort. There are two ways to choose a list.
 1.) Press **2nd STAT** and select the appropriate list and press **ENTER** twice or 2.) Press 2nd and one of the numbers 1 - 6 for L1 – L6 and press **ENTER**.

```

SortA(L1)
Done

```

- 3.) To see the sorted data, press **STAT** and select **EDIT** and the list will now be sorted. Use the arrow keys to scroll through the list to find the mode.

L1	L2	L3	Z
2	5	-----	
3	5		
4	5		
5	5		
6	5		
7	5		
8	5		
9	5		
L2(1)=5			

Matrices

To Enter Data into a Matrix:

- Press **2nd** **x⁻¹** and use the blue arrow keys to arrow over to **EDIT**. Choose the matrix you wish to name and enter data.

```

NAMES MATH [0]
[1] [A]
2: [B]
3: [C]
4: [D]
5: [E]
6: [F]
7↓ [G]
  
```

- You will be prompted to enter in the dimensions of the matrix (row by column). Then fill in the values in the appropriate rows and columns.

```

MATRIX[A] 3 ×2
[0] 0
[0] 0
[0] 0
1, 1=0
  
```

```

MATRIX[A] 3 ×2
[2 -3]
[5 4]
[1 -8]
3, 2=-8
  
```

To Add/Subtract/Multiply Matrices:

- Make sure you are in the home screen for matrix operations. Press **2nd** **MODE**.
- Press **2nd** **x⁻¹** and make sure that **NAME** is highlighted. Choose the matrix you wish to add/subtract/multiply and press enter.
- Repeat step 2 above to enter in another matrix. (*Remember: in order to multiply matrices, the number of columns in the first matrix must equal the number of rows in the second matrix.)

```

[A]+[B]
[[7 -6]
 [11 13]
 [8 -7]]
  
```

```

[A]-[B]
[[-3 0]
 [-1 -5]
 [-6 -9]]
  
```

```

2[A]
[[4 -6]
 [10 8]
 [2 -16]]
  
```

```

[A]*[C]
[[22 1 -11]
 [9 60 7]
 [37 -32 -25]]
  
```

One-Variable Statistics

To Enter Data into a List:

- 1.) To access this list press **STAT** and choose **EDIT** and then press **ENTER**.

```

2nd CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
  
```

L1	L2	L3	1
-----	-----	-----	
L1(1) =			

To Calculate the Statistics of a List:

- 1.) Press the **STAT** key and use the blue arrow to move to **CALC**. Select **1-Var Stats** and press **ENTER**.

```

EDIT 2nd CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
  
```

```

1-Var Stats
  
```

- 2.) The calculator is now waiting for you to tell it which list to calculate. There are two ways to choose a list. 1.) Press **2nd STAT** and select the appropriate list and press **ENTER** twice or 2.) Press 2nd and one of the numbers 1 - 6 for L1 – L6 and press **ENTER**. Use the blue arrow keys to scroll up or down to see all of the statistics.

```

1-Var Stats
x̄=18.08333333
Σx=217
Σx²=8245
Sx=19.8194502
σx=18.97567888
↓n=12
  
```

```

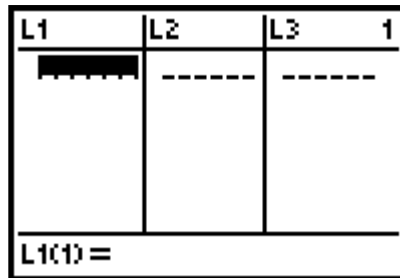
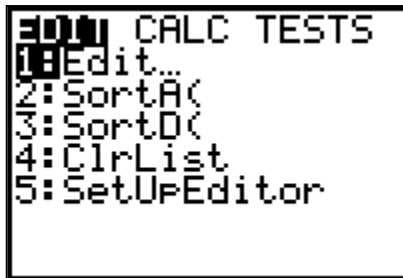
1-Var Stats
↑n=12
minX=5
Q1=6.5
Med=9
Q3=23.5
maxX=65
  
```

\bar{x}	Mean Average of Set
Σx	Sum of the Elements of the Set
n	Total Number of Elements in the Set
$\min X$	Minimum Value
Q_1	Lower Quartile
Med	Median
Q_3	Upper Quartile
$\text{Max} X$	Maximum Value
S_x	Sample Standard Deviation of x
σ_x	Population Standard Deviation of x

Scatterplots

To Enter Data into a List:

- 1.) To access this list press **STAT** and choose **EDIT** and then press **ENTER**.

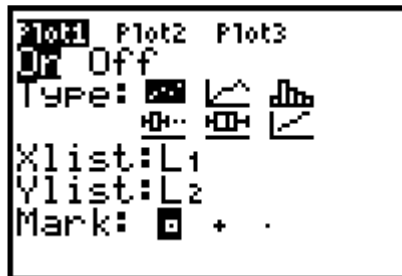


To Graph a Scatterplot:

- 1.) To access the scatter plot in the **STAT PLOT** screen, press **2nd** **Y=**.

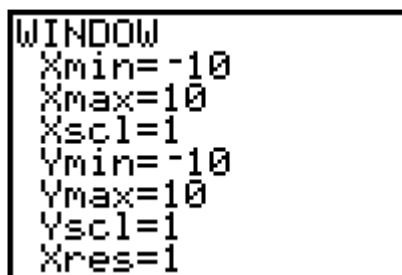


- 2.) Highlight the **ON** function and choose the first type of graph.



Make sure that the **Xlist** and **Ylist** is assigned to the appropriate lists of data.

- 3.) To display your graph, press **ZOOM**, then select **ZOOM STAT** to automatically adjust the window for the entered statistics.



Before you can calculate a regression equation, follow the instructions for Creating a Scatterplot.

To Calculate a Regression Equation:

- Once you have entered data into the appropriate list, go to the home screen.
- Press **STAT** and choose **CALC**.

```
EDIT [F1] TESTS
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
8:LinReg(a+bx)
9:LnReg
0:ExpReg
```

```
LinReg(ax+b) L1,
L2
```

- Choose the type of regression equation with **Xlist**, **Ylist** (respectively). There are two ways to choose a list. 1.) Press **2nd** **STAT** and select the appropriate list and press **ENTER** twice or 2.) Press 2nd and one of the numbers 1 - 6 for L1 – L6. Press **ENTER**.

```
LinReg
y=ax+b
a=.4333333333
b=5.933333333
r2=.1712259372
r=.4137945592
```

r - represents the correlation coefficient
 r^2 - represents the coefficient of determination

You can turn the diagnostics (r and r^2) by going to **2nd** **0** (**CATALOG**) and scrolling to find Diagnostics.

```
CATALOG
DependAuto
det(
DiagnosticOff
▶DiagnosticOn
dim(
Disp
DispGraph
```

To Paste the Regression Equation into **Y=**:

- You must have first calculated the equation using the steps above.
- Go to **Y=**, clear any existing equations, then go to **2nd** **Y=** and make sure that your scatterplot is turned on.

- 3.) While in the **Y=** screen, press **VAR** and select **5:Statistics**.

```

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

```

- 4.) Use the blue arrow key to move over to **EQ**.

```

XY Σ EQ TEST PTS
1:RegEQ
2:a
3:b
4:c
5:d
6:e
7:↓r

```

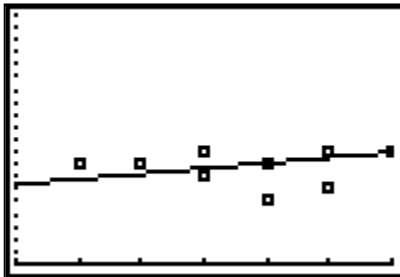
- 5.) Choose **RegEQ** and the regression equation will be automatically pasted into the **Y=** screen.

```

Y= Plot2 Plot3
1:Y1 = .43333333333333
3333X+5.9333333333
3333
2:Y2 =
3:Y3 =
4:Y4 =
5:Y5 =

```

- 6.) To see the scatterplot with linear regression, press **GRAPH**. If you cannot see the data and the regression line, press **ZOOM**, then select **ZOOM STAT** to automatically adjust the window for the entered statistics.



Box and Whisker Plots

To Enter Data into a List:

- 1.) To access this list press **STAT** and choose **EDIT** and then press **ENTER**.

```

3:000 CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
  
```

L1	L2	L3	1
████████	-----	-----	
L1(1) =			

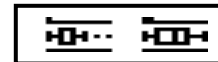
To Graph a Box and Whisker Plot:

- 1.) To access the box and whisker plot in the **STAT PLOT** screen, press **2nd** **Y=**.

```

5:00000000
1: Plot1...Off
  [ON] L1 1
2: Plot2...Off
  [ON] L2 1
3: Plot3...Off
  [ON] L1 L2
4: PlotsOff
  
```

- 2.) Highlight the **ON** function, choose the type of box and whisker plot (outliers or no outliers), and choose the list that your data is located.



```

2:001 Plot2 Plot3
Off Off
Type: [ ] [ ] [ ]
      [ON] [ ] [ ]
Xlist: L1
Freq: 1
  
```

Make sure that the **Xlist** is assigned to the appropriate list of data.

- 3.) Repeat this procedure to display more than one box and whisker plot at one time.
- 4.) To display your graph, press **ZOOM**, then select **ZOOM STAT** to automatically adjust the window for the entered statistics.

```

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

```

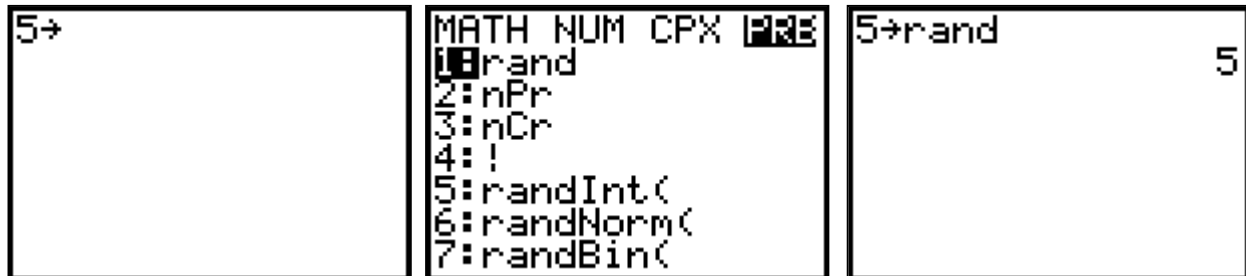
2:000 MEMORY
4: ZDecimal
5: ZSquare
6: ZStandard
7: ZTrig
8: ZInteger
9: ZoomStat
[ON] ZoomFit
  
```

Random Number Generator

To generate random numbers on the TI-83, the random numbers must be “seeded” with a starting value. If they are not seeded but left to default, then all students will generate the same random sequence.

- 1.) Follow the keystrokes below:

(input any number) **STO** **MATH** **→** **→** **→** **(PRB)** **ENTER** **ENTER**



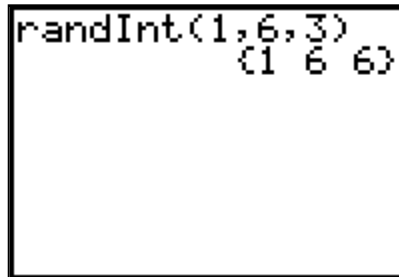
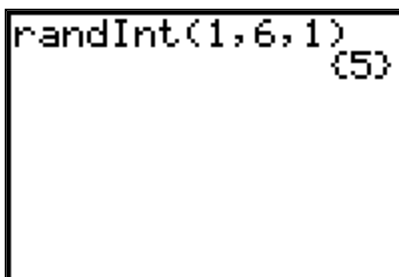
- 2.) Once the calculator is seeded with a starting value, *random numbers* can be generated by the following keystrokes:

MATH **→** **→** **→** **(PRB)** **ENTER** **ENTER**



- 3.) To generate *random integers* (the equivalent of rolling an n-sided die), follow the keystrokes below:

MATH **→** **→** **→** **(PRB)** **5:randInt(** **min#** **,** **max#** **,** **# of elements** **)**



The first number represents the lowest integer, the second number represents the largest integer, and the last number represents the number of results. In the first example above, the result that was shown was equivalent to one roll of a six-sided die while the other example was equivalent to rolling three six-sided die at once.

- 4.) To generate another random integer(s)/number(s), simply press **ENTER** again.

5.) To generate a string of *random number trials*, follow the keystrokes below:

MATH → → → **(PRB)** **7:randBin(** **# of trials** , **probability of success** , **# of simulations**)

```
randBin(7,0.5,5)
      {3 7 2 4 5}
```

For example, we could model a simulation of tossing a coin seven times with five simulations to determine the number of times heads shows up in each simulation.

According to the example, heads showed up three times in the first simulation, seven times in the second, two in the third, etc.

Graphing Simulation Results

To Display Results of Simulation Using a Frequency Graph:

- 1.) Use **randInt** or **randBin** to generate a list of data. (example: rolling a six-sided die fifty times)

```
randInt(1,6,50)
(4 2 5 3 2 3 3 ...
```

- 2.) Store the data in a list. Press **STO** and enter a list name. There are two ways to choose a list. 1.) Press **2nd** **STAT** and select the appropriate list and press **ENTER** twice or 2.) Press **2nd** and one of the numbers 1 - 6 for L1 – L6 and press **ENTER**. You can view the list by going to **STAT** and **EDIT**.

```
randInt(1,6,50)
(4 2 5 3 2 3 3 ...
Ans→L1
```

L1	L2	L3	1
4	---	---	
2	---	---	
5	---	---	
3	---	---	
2	---	---	
3	---	---	
3	---	---	
L1(1)=4			

- 3.) To access the frequency graph in the **STAT PLOT** screen, press **2nd** **Y=**.

```
5: STAT PLOTS
1: Plot1...Off
  [ON] L1 1
2: Plot2...Off
  [ON] L2 1
3: Plot3...Off
  [ON] L1 L2
4: PlotsOff
```

- 4.) Highlight the **ON** function, choose the frequency graph and choose the list where your data is located. Make sure that the **Xlist** is assigned to the appropriate list of data.

```
Plot1 Plot2 Plot3
[ON] Off
Type: [ ] [ ] [ ]
      [ON] [ON] [ON]
Xlist:L1
Freq:1
```

5.) Press **WINDOW**, and use the chart below to set the values.

Xmin	Lowest value in the simulation
Xmax	Highest value in the simulation
Xscl	1 – Depends on how you scale the x-axis
Ymin	0
Ymax	Set high than the highest occurring element

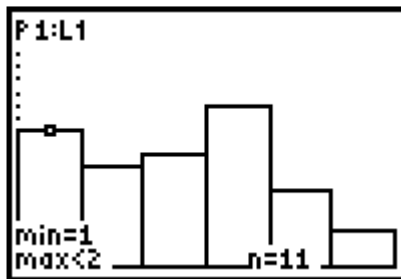
```

WINDOW
Xmin=1
Xmax=7
Xscl=1
Ymin=0
Ymax=20
Yscl=1
Xres=1

```

6.) Press **GRAPH**.

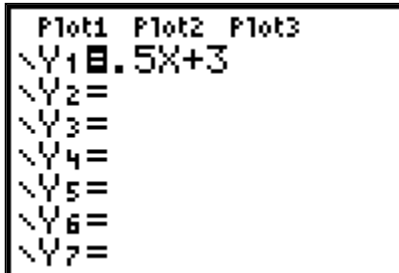
7.) Use **TRACE** to scroll through the graph



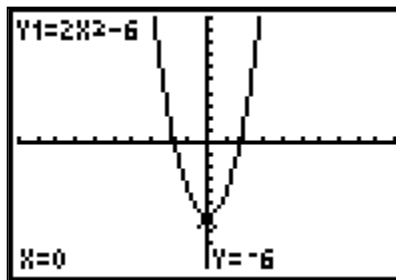
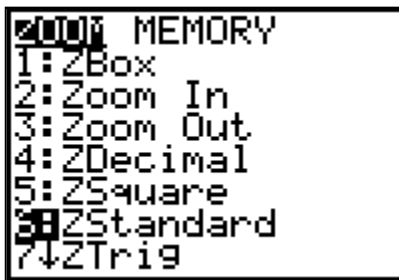
Graphing Parabolas

To Graph a Parabola:

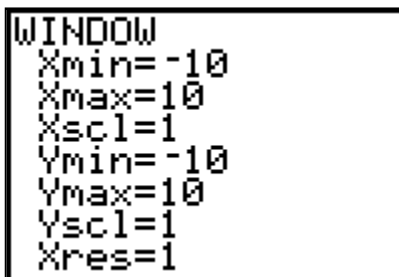
- 1.) Press **Y=** and enter the equation into **Y₁**



- 2.) To see the graph in a standard screen (10 x 10), press **ZOOM** and select **6:Zstandard**. Use **TRACE** to see the solutions on the bottom of the screen. **TRACE** will automatically show the y-intercept.

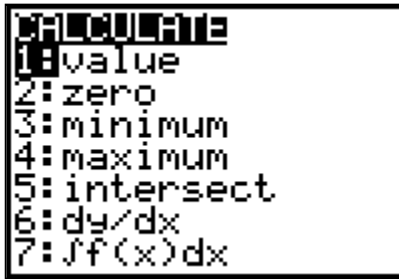


- 3.) To adjust the window manually, press **WINDOW** and change the settings.

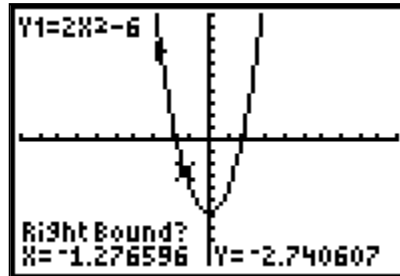
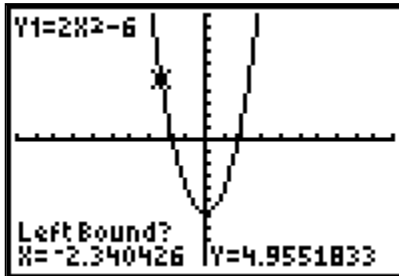


To Find the Zero, Minimum, or Maximum of a Parabola:

- 1.) Press **2nd** **TRACE** for the Calculate Menu.



- 2.) Select either **2:Zero**, **3:Minimum**, or **4:Maximum**.
- 3.) Use the arrows to place the cursor to the left of the possible answer and press **ENTER**.
- 4.) Use the arrows to place the cursor to the right of the possible answer and press **ENTER**.



- 5.) Press **ENTER** one last time when the calculator asks for Guess. The solution will then be displayed at the bottom of the screen.

