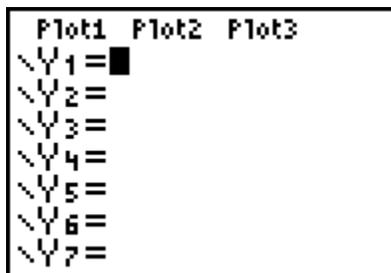# FINDING MAX AND MIN

Investigation   : Finding maxima and minima using the TI-83 Plus by graphing parabolas.

Step 1: Turn on the TI-83 Plus by pressing the [ON] button in the bottom left hand corner of the calculator.

Step 2: Press the [Y=] button in the upper left hand corner of the calculator. Your new   screen should look like the picture below.
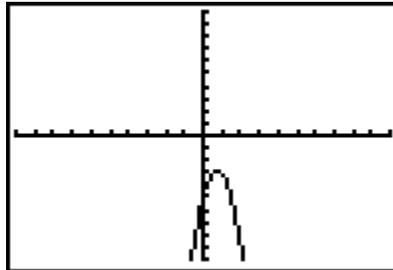
```
Plot1  Plot2  Plot3
\Y1=█
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Step 3: With the cursor blinking in the [Y=] location, type the following equation: $y = -4x^2 + 6x - 5$

```
Plot1  Plot2  Plot3
\Y1=-4X²+6X-5
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```
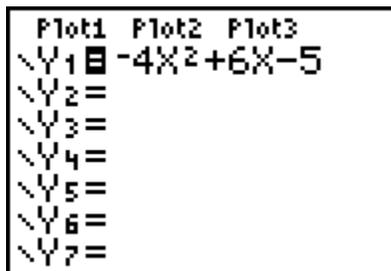
Step 4: Press the [GRAPH] button in the upper right hand corner of the calculator.

Step 5: The following graph should appear on your screen.

Step 6: **Press the yellow ⟨2nd⟩ button on the calculator and then press the ⟨TRACE⟩ button. You should get a menu that looks like the following**


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

Question: **Based on the graph shown on our screen, do you think we will be finding the maximum or the minimum value?**

Step 7: **Using the down arrow⟨▼⟩, scroll down until the number 4, maximum is highlighted.**


```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```
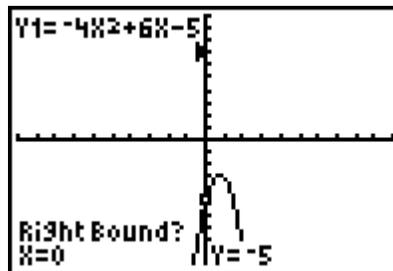
Step 8: Press the ⌊ENTER⌋ key in the bottom right hand corner of the calculator.

Step 9: There should be a blinking cursor located on your graph. There should also be the equation shown in the upper left hand corner, the words LEFT BOUND?
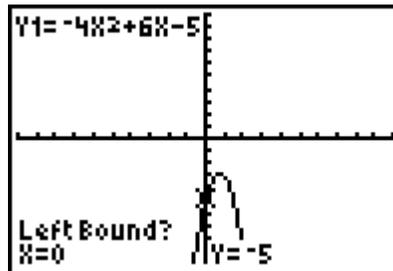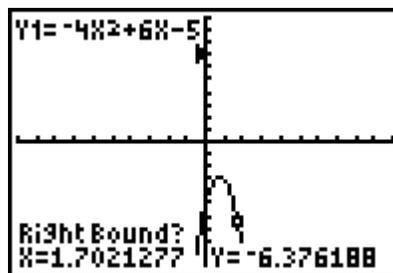

Step 10: Press the ⌊ENTER⌋ key.

Step 11: There should be a blinking cursor still located on your graph. In the bottom left hand corner should now be the words RIGHT BOUND?
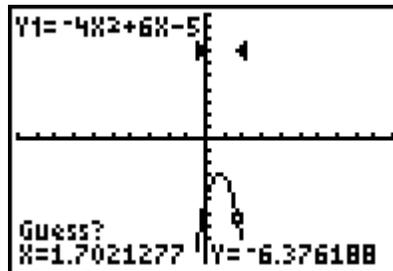

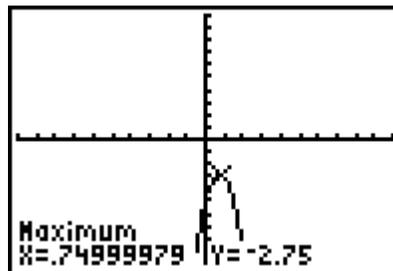**Step 12:** Using the right arrow key⌊▸⌋, move the cursor to the right until it is beyond the expected maximum value.

Step 13: Press the $\boxed{\text{ENTER}}$ **key**

Step 14: There should be a blinking cursor still located on your graph. In the bottom left hand corner should now be the words GUESS?

Step 15: Move the cursor using the left arrow key $\boxed{\triangleleft}$ **as close to the maximum as possible. Press the** $\boxed{\text{ENTER}}$ **key.**

Maximum   value: Your calculator should give you a maximum value of -2.75

Cleanup: Press the $\boxed{\text{Y=}}$ **button and then** $\boxed{\text{CLEAR}}$ **to remove the equation.**

Exploration:
Using steps 3-15, find the minimum or maximum value of the following equations. Indicate which equation has a minimum value or a maximum value. Record your answers.

1. $y = 3x^2 - 2x + 1$

2. $y = -2x^2 + 4x + 3$

3. $y = 2x^2 - x - 3$

4. $y = \dfrac{3}{4}x^2 + 2x + 1$