Warm Up

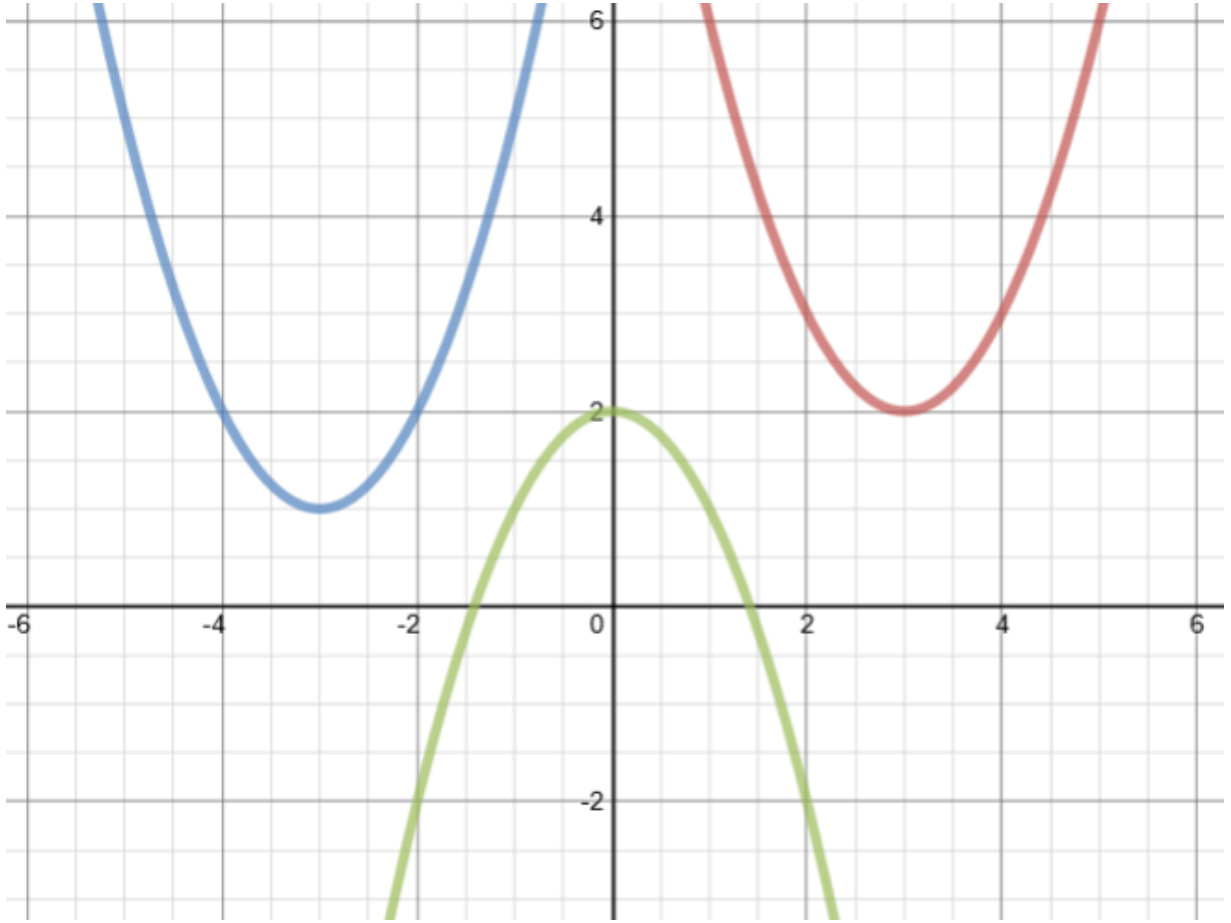
Thursday, February 5, 2015

Name the transformations that have been applied to parent function

1. $\frac{1}{2}\sqrt{x-3}+2$

2. $(x+7)^3-4$

Write the equation for the functions pictured in the graph and the location of each vertex.



3. (Blue)
4. (Red)
5. (Green)

Quadratic Formula

Objectives

Solve Quadratic Expressions Using the Quadratic Formula.

Use the Discriminant to determine the number and type of roots for a quadratic function.

Use graphing calculator to solve Quadratic Equations

Homework

4-8 Complex Numbers Practice 38-41

Extra Practice

35-43

55-63 odd

66-71

72-77

Don't panic, we'll do most of these in class.

Homework Questions

Let’s sing!

POP QUIZ!

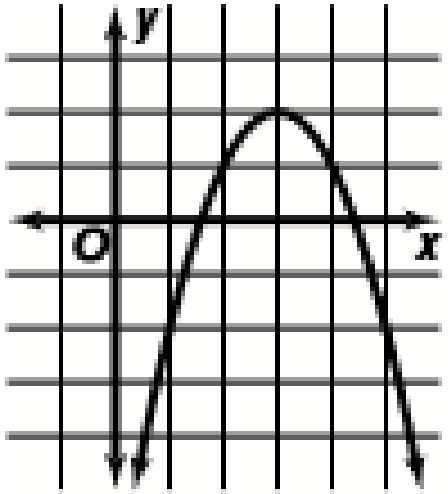
Write the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Quadratic Formula

What's different about each of the graphs below?

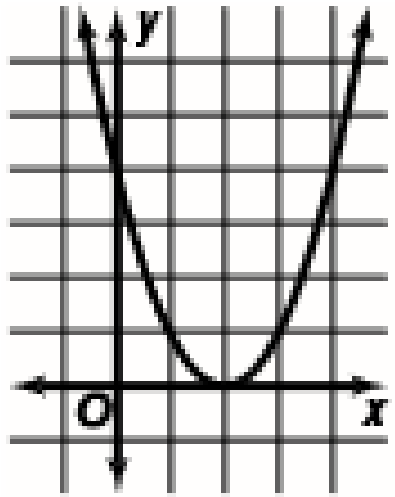
a.



Crosses x axis twice

2 Real Roots

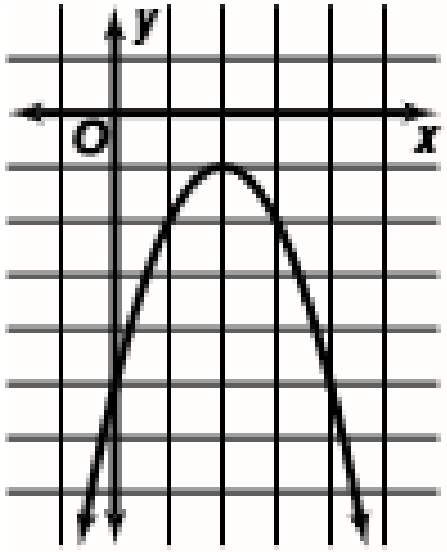
b.



Vertex on x axis

1 Repeated Root

c.



Does not cross the x axis

No real roots

Quadratic Formula

The **discriminant** of a quadratic equation tells us how many solutions (roots) exist for a given quadratic equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If $b^2 - 4ac > 0$	If $b^2 - 4ac = 0$	If $b^2 - 4ac < 0$
positive	1 repeated	negative
2 real roots	real root	no real roots

Quadratic Formula

Lets look at $3x^2 - 7x = -2$

Put in standard form; $3x^2 - 7x + 2 = 0$

The discriminant is $b^2 - 4ac$.
For this equation, $a = 3$, $b = -7$ and $c = 2$

The discriminant for this equation is $(-7)^2 - 4(3)(2) = 25$.

What does that tell us?

Since $25 > 0$ there are **two real roots.**

Graph this equation

Quadratic Formula

Lets look at $x^2 + 4x + 4 = 0$

The discriminant is $b^2 - 4ac$.
For this equation, $a = 1$, $b = 4$ and $c = 4$

The discriminant for this equation is $4^2 - 4(1)(4) = 0$.

What does that tell us?

Since $0 = 0$ there is **one real repeated root**.

Graph this equation

Quadratic Formula

Lets look at $3x^2 - 4x + 10 = 0$

The discriminant is $b^2 - 4ac$.
For this equation, a = 3, b = -4 and c = 10

The discriminant for this equation is $(-4)^2 - 4(3)(10) =$ **-104**.

What does that tell us?

Since -104 < 0 there are no real roots!

Graph this equation

Quadratic Formula

Find the discriminant of each equation and determine the number of real solutions.

$$b^2 - 4ac$$

1. $-x^2 + 2x - 9 = 0$

2. $x^2 + 17x + 4 = 0$

3. $x^2 - 6x + 9 = 0$

Quadratic Formula

Use the quadratic formula to find the roots of this equation.

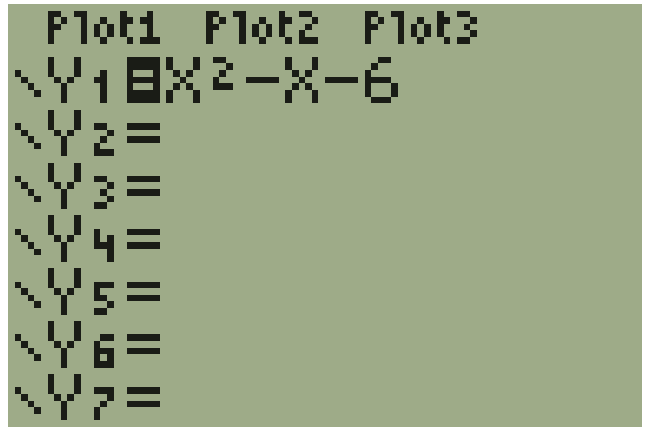
$$3x^2 - 4x + 10 = 0$$

Complex roots always come in pairs!

Solving with the Calculator

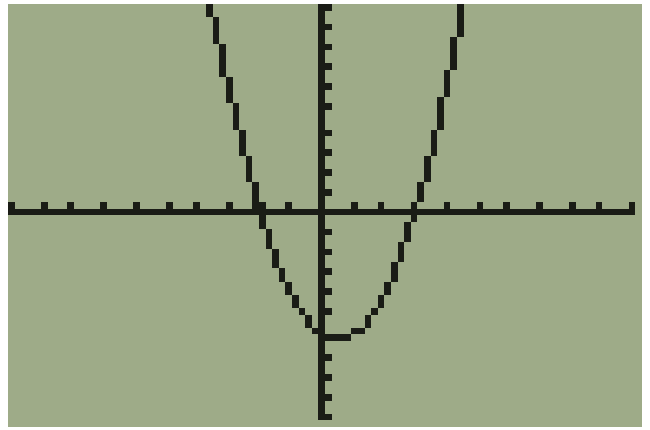
You can use the graphing calculator to find the solutions to a quadratic equation.

Enter the equation $x^2 - x - 6$ into y_1

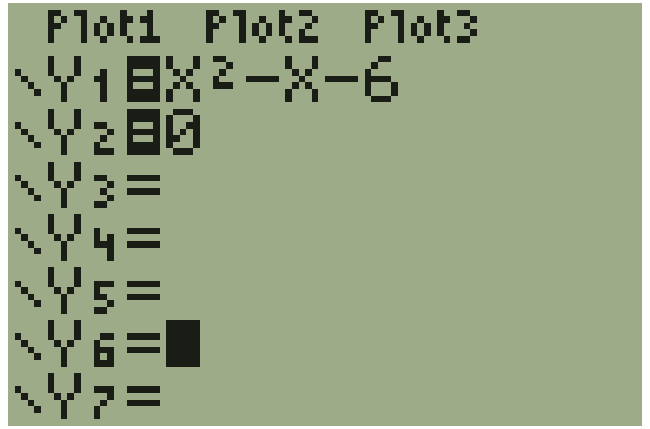


Press the graph button.

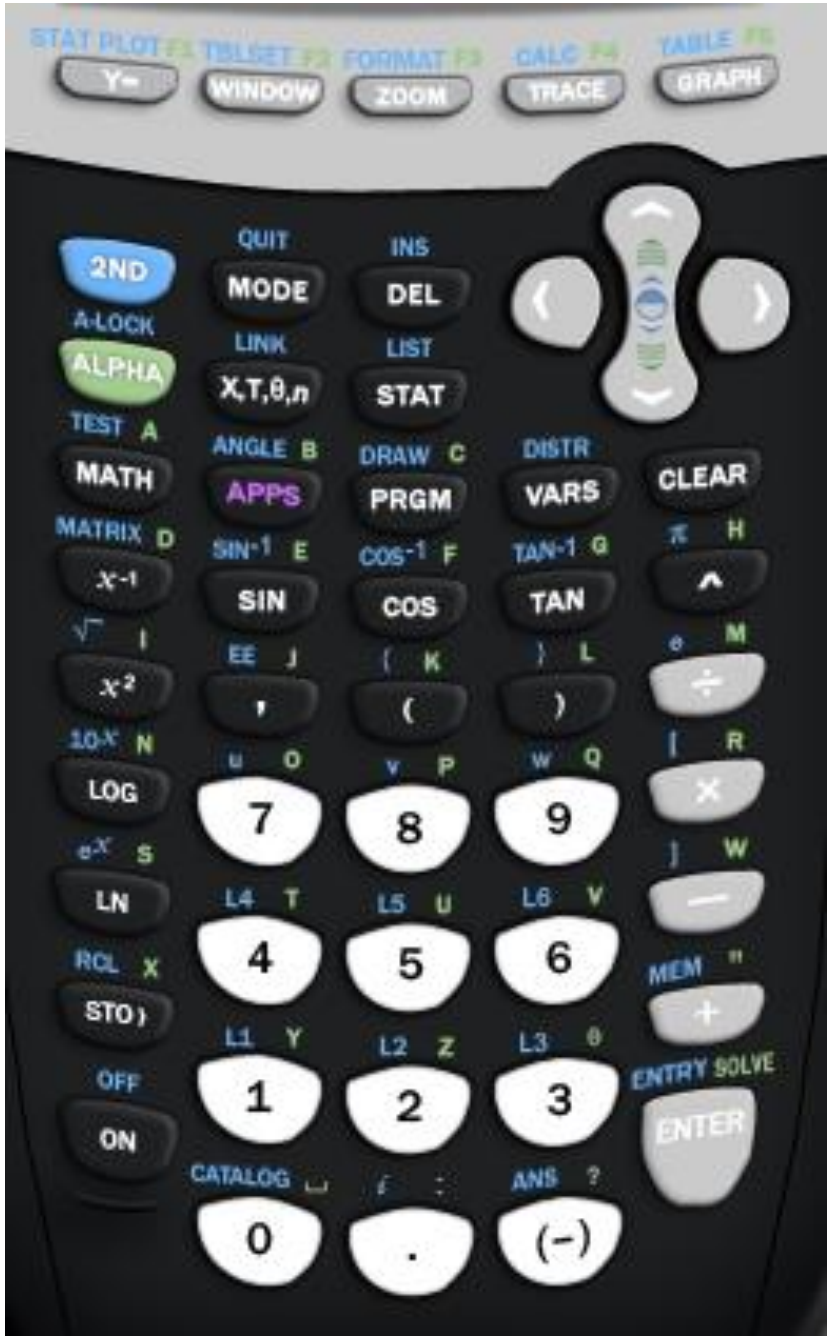
How many solutions? Type?



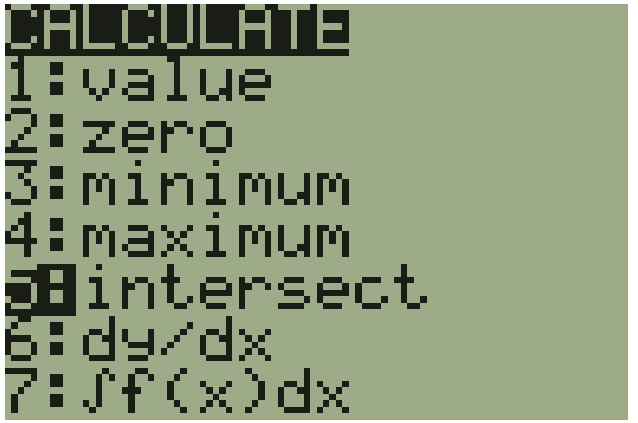
Enter 0 in y_2



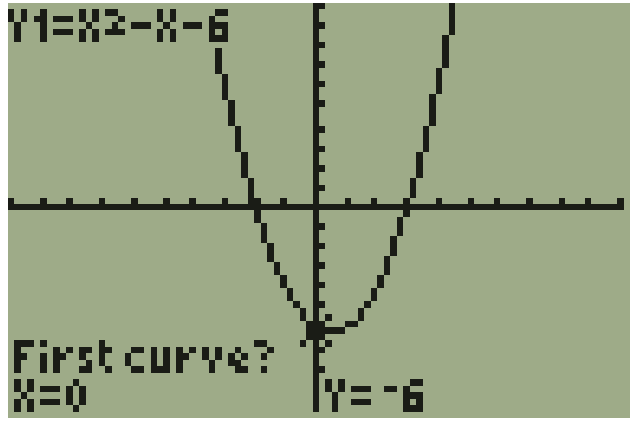
Solving with the Calculator



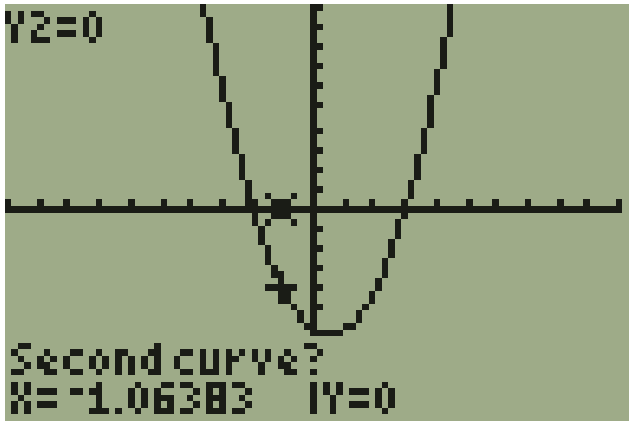
Press 2nd TRACE and select 5:intersect



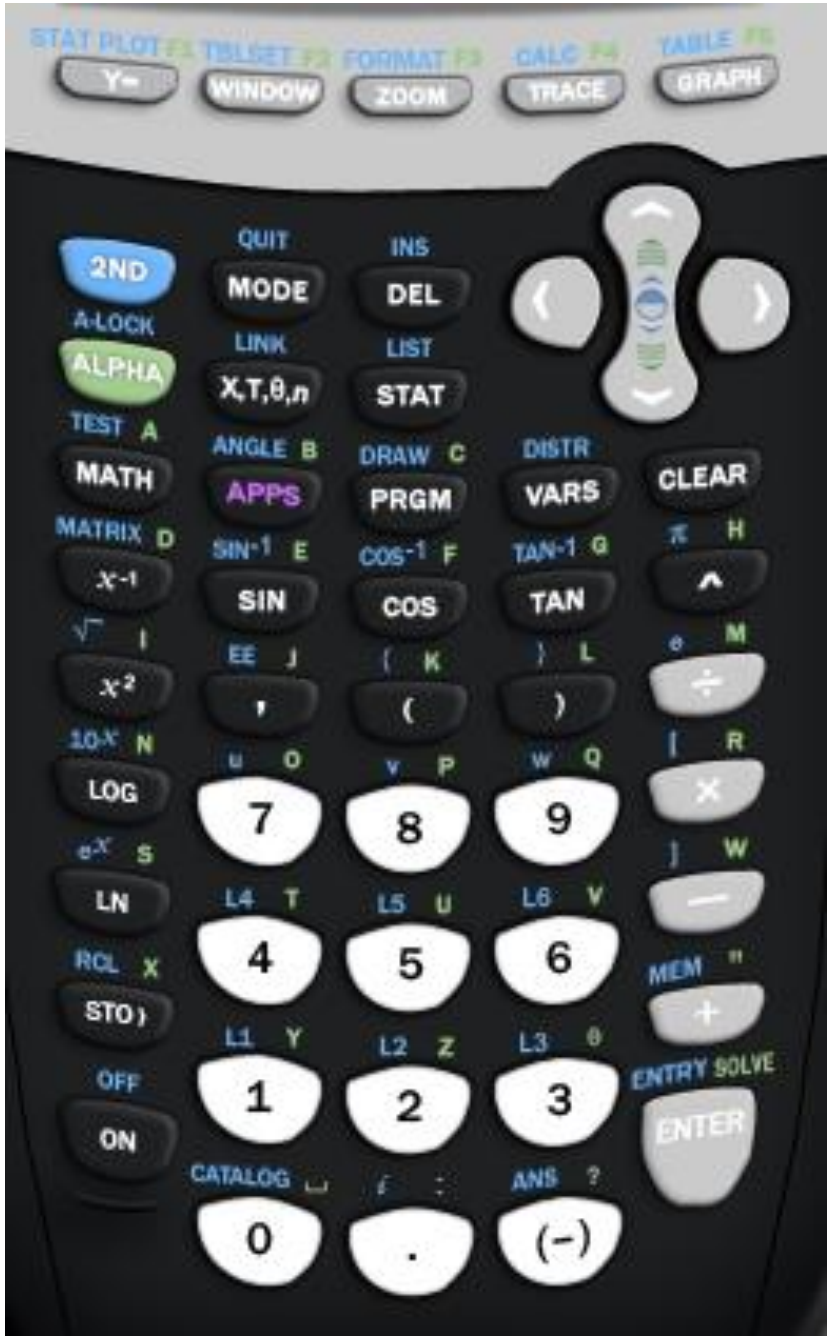
The cursor will be positioned on y_1. Press enter to select this function.



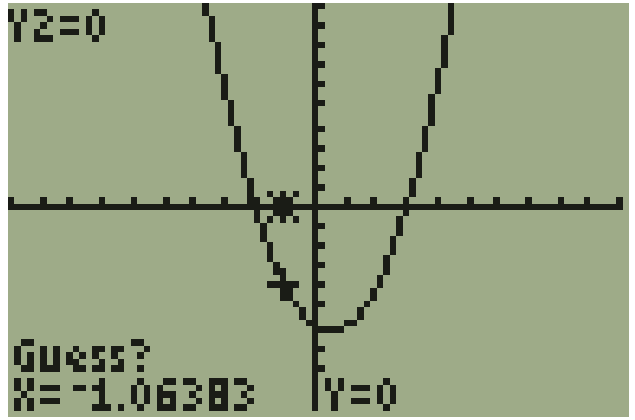
The cursor will jump to y_2 which is the x axis. Press enter to select this function.



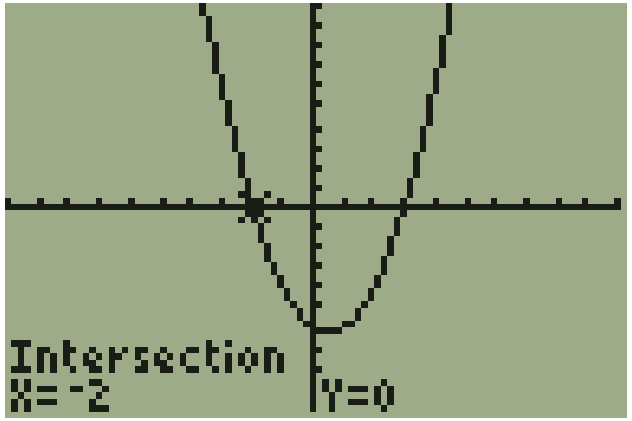
Solving with the Calculator



You will be asked for a guess. Just press enter again.



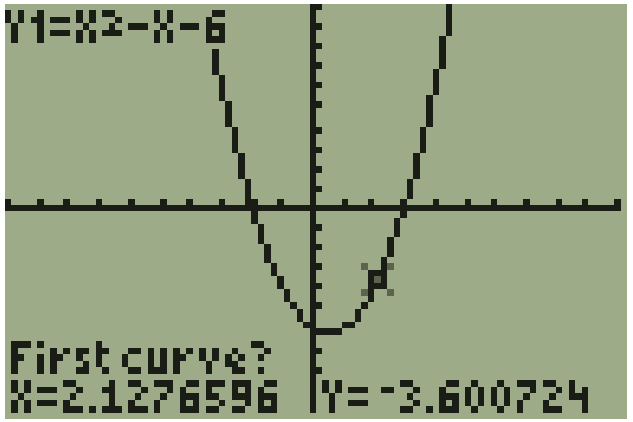
The intersection is one of the solutions. In this case it's $x = -2$



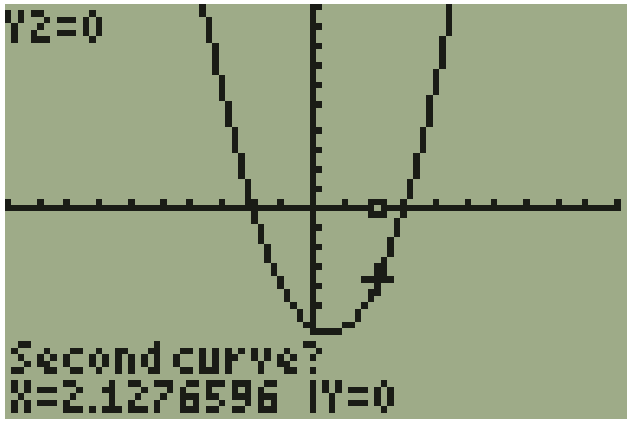
Now we repeat the process to find the other solution.

Solving with the Calculator

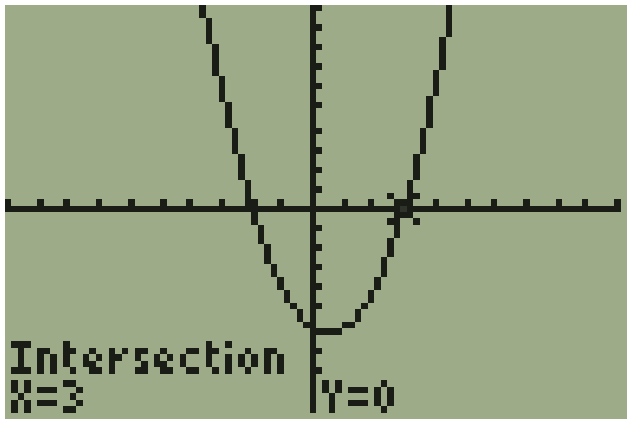
2nd TRACE intersection



Move the cursor to the other side of the vertex. Then press enter.

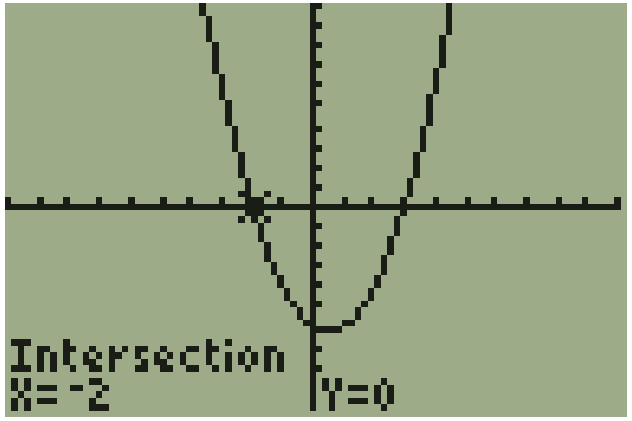


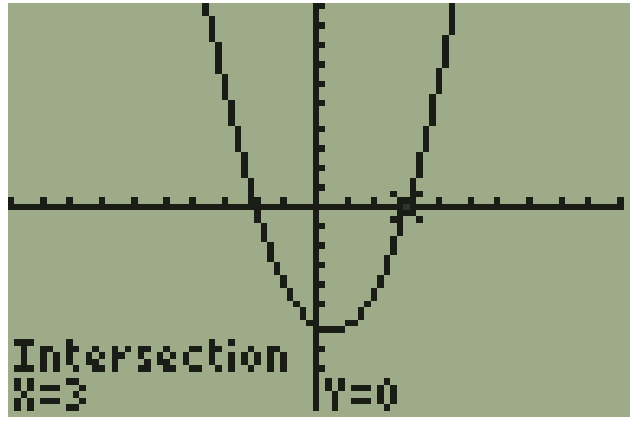
Press enter twice. This is the second solution to this equation.



Solving with the Calculator

So our two solutions are $x = -2$ and $x = 3$





Just for grins, verify the solutions using the quadratic formula.

$$x^2 - x - 6$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{1 \pm \sqrt{1 - 4(1)(-6)}}{2}$$

$$x = \frac{1 \pm \sqrt{25}}{2} = \frac{1 \pm 5}{2}$$

$$x = \frac{6}{2} = 3 \qquad x = \frac{-4}{2} = -2$$