If you sell 400 tickets to a play for $8 each, what is the income from ticket sales?

Income = (# of tickets)($ per ticket) = (400)(8) = $3200

A concert hall usually sells 1000 tickets at $30 each. They want to maximize their income. The predict that for each $5 increase in price they will sell 80 fewer tickets.

a. Write an equation to model the income.

x = number of $5 increases.

TICKETS $ per ticket

$$I = (1000 - 80x)(30 + 5x)$$

$$I = -400x^2 + 2600x + 30{,}000$$

b. Find the price they should charge for a ticket that will maximize their income.

The maximum occurs at the Vertex

(x, I)

$$\frac{-2600}{-800} = 3.25$$

this represents 3.25 increases of $5 each

Final Ticket Price $= (30 + 5(3.25))$

$= \boxed{\$46.25}$

Given this equation: $x^2 + x + 2 = 0$

Can you solve this equation by taking square roots?

No, Square roots can't be used if there is a linear term

Given this equation: $x^2 + x + 2 = 0$

Can you solve this equation by factoring?

+2

+1

No, this doesn't factor. There are no integers that multiply to 2 and add to 1

Factoring works SOME of the time.

Using Square Roots works SOME of the time.

1. When in Standard Form and b=0
2. When in Vertex Form

Is there anything that works ALL of the time?

Quadratic Formula

Sec 5-8: The Quadratic Formula

Equation must be written in the following form:

$$ax^2 + bx + c = 0$$

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

The results of using the Quadratic Fomula represent:

- solutions to the equation
- zeros of the function
- x-intercepts of the graph
- roots of the function

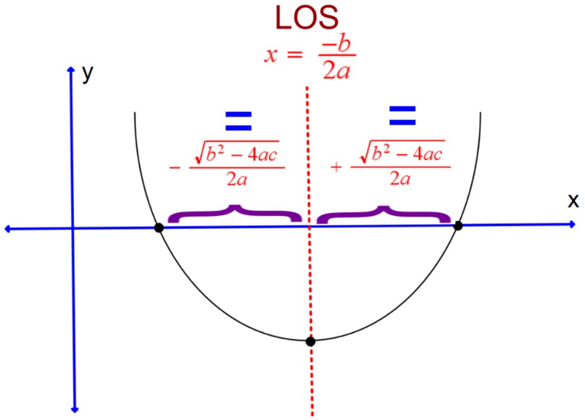
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Can be written as:

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

LOS

?



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

Can be written as:

$$\boxed{x = \underbrace{\frac{-b}{2a}}_{\text{LOS}} \pm \underbrace{\frac{\sqrt{b^2-4ac}}{2a}}_{\text{Distance from LOS to both x-intercepts.}}}$$

Find the solutions to this quadratic equation using the Quadratic Formula. Round to the nearest hundredth as necessary.

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

$$6x^2 + 7x - 20 = 0$$

1st: Find $b^2 - 4ac$ = 529

2nd: Rewrite the Quadratic Formula
Using this value in place of
b^2 - 4ac and replace 2a with its value

$$\frac{-7 \pm \sqrt{529}}{12}$$

3rd: Calculate the two answers

$x = 1.33, -2.5$

Find the EXACT Solutions.

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

$$5x^2 - 7x + 8$$

$b^2 - 4ac = -111$

No Real Solution

because $\sqrt{-111}$ is not a real number

Discriminate: recognize a distinction; differentiate

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

What part of the Quadratic Formula determines if there are Real solutions or not?

The DISCRIMINANT $\longrightarrow$ $b^2 - 4ac$

Depending on the value of the DISCRIMINANT you can determine how many and what kind of solutions there will be.

Discriminant	# and kind of solutions
$b^2 - 4ac > 0$	2 Real Solutions
$b^2 - 4ac = 0$	1 Real Solution
$b^2 - 4ac < 0$	0 Real Solutions or 2 Imaginary Solutions

Tell the number of solutions each quadratic equation has and if they are real or imaginary.

1. $x^2 + 8x - 3 = 0$

   $b^2 - 4ac = 76$

   2 Real Solutions

2. $2x^2 - 7x + 8 = 0$

   $b^2 - 4ac = -15$

   2 Imaginary Solutions

3. $-3x^2 - 4x + 5 = 0$

   $b^2 - 4ac = 76$

   2 Real Solutions

4. $2x^2 - 20x + 50 = 0$

   $b^2 - 4ac = 0$

   1 Real Solution

5. $-4x^2 + 7x - 2 = 0$

   $b^2 - 4ac = 17$

   2 Real Solutions

For some of these equations you can tell that there will be 2 Real solutions without doing anything. Which ones? #'s 1 & 2

A Quadratic Equation always has two real solutions if:

$b^2 - 4ac$ is positive

$b^2 - 4ac$ will ALWAYS be positive if:

Either a OR c is negative.