Announcements:

Exam 2 Next Week.
Due dates different next week.
Graphically, here are some scenarios with lines & square rt. functions.
Ex) Solve $x - 2 = \sqrt{7x - 6}$

Steps:
1) Isolate square root expression
2) Square both sides.
3) Solve the resulting equation (linear or quadratic in our class).
4) Check answers.

$(x - 2)^2 = (\sqrt{7x - 6})^2$

$(x - 2)(x - 2) = 7x - 6$

$x^2 - 4x + 4 = 7x - 6$

$x^2 - 11x + 10 = 0$ (Now we have a quadratic equation)

$(x - 10)(x - 1) = 0$

$x = 10$ or $x = 1$
\[ x - 2 = \sqrt{7x - 6} \]

Check \( x = 10 \)

\begin{align*}
\text{Left:} & \quad 10 - 2 = 8 \\
\text{Right:} & \quad \sqrt{70 - 6} = \sqrt{64} = 8
\end{align*}

\( x = 10 \) works!

Answer: \( x = 10 \)

Remember, the square root function \( y = \sqrt{x} \) can only have 1 output assigned to each input. We use the positive square root here (called the "principal" square root).
IC #1: Solve \( x = \sqrt{x+2} \)

\[
\begin{align*}
    x^2 &= x + 2 \\
    x^2 - x - 2 &= 0 \\
    (x-2)(x+1) &= 0
\end{align*}
\]

\( x = 2 \) or \( x = -1 \)

\( \text{Marked: } x = -1 \) is incorrect, \( x = 2 \)

Graph:
- \( y = x \) (left)
- \( y = \sqrt{x+2} \)
Quadratic Inequalities.

Solve: \( x^2 - 11x + 10 = 0 \)  
2 solutions  
\( x = 10, x = 1 \)

Solve: \( x^2 - 11x + 10 > 0 \)  
(solutions will be intervals)

2 methods to solve quadratic inequalities: (a) graphing  
(b) number line & test values
Example: Graphing Method of solving

\[ x^2 - 11x + 10 > 0. \]

General Steps

a) Make sure 0 is on the right side of inequality.

b) Find the zeros of the quadratic

\( x = 10, \ x = 1 \) → not solutions in this problem

c) Determine whether the quadratic opens ↑ or ↓ (opens up in our case)

d) Sketch parabola

e) Extract solution from graph.
Final Answer: \( x < 1 \) or \( x > 10 \)

**Example: Number Line Technique**

Step (a) & (b) above are the same.

Step (c) Plot zeros on a number line.

Solve \( x^2 - 11x + 10 > 0 \) you need something... Values.

Sign tells you something... Values.

**Signs of the output**

\( x < 1 \) or \( x > 10 \)
Tobacco sales in a certain place is given by \( y = -0.084x^2 + 1.124x + 4.028 \)

\( x \): # of years since 1986

\( y \): millions of pounds.

When will sales be at least (weight)

5,940,000 pounds?

\[-0.084x^2 + 1.124x + 4.028 \geq 5.94\]

This is a quadratic inequality.

\[-0.084x^2 + 1.124x - 1.912 \geq 0\]

Next step: find zeros of the quadratic (use quadratic formula)

\( a = -0.084, \ b = 1.124, \ c = -1.912 \)

(you can finish.... but check that answer make sense! Pay attention)
to units)