

Section 2.8 / More Equations & Inequalities

Note Title

2/27/2008

① Equations With Square Roots.

A) Solve for x , and check your answers:

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

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

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

$$x^2 - 11x + 10 = 0$$

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

$$x-10=0 \quad \text{or} \quad x-1=0$$

$$x=10$$

or

$$x=1$$

---, but we need to check both answers.

$$x-2 = \sqrt{7x-6}$$

Check $x=10$:

$$10-2 \stackrel{?}{=} \sqrt{7(10)-6}$$
$$8 = \sqrt{64}$$

$x=10$

WORKS.

$$8 = 8$$

Check $x=1$:

$$\underline{1}-2 \stackrel{?}{=} \sqrt{7(\underline{1})-6}$$
$$-1 \neq \sqrt{1}$$

$x=1$

does

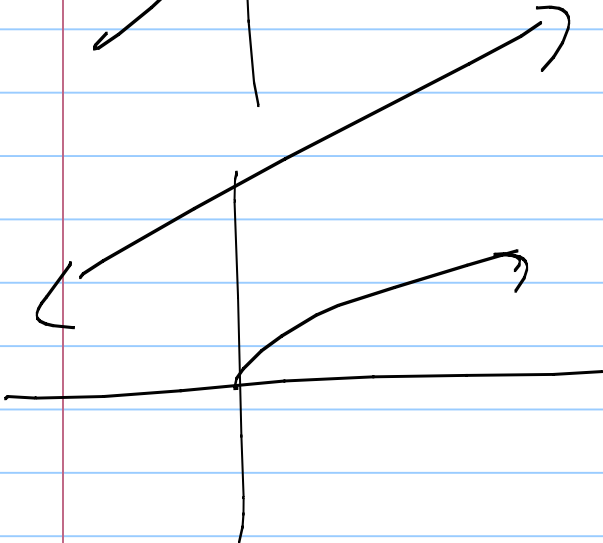
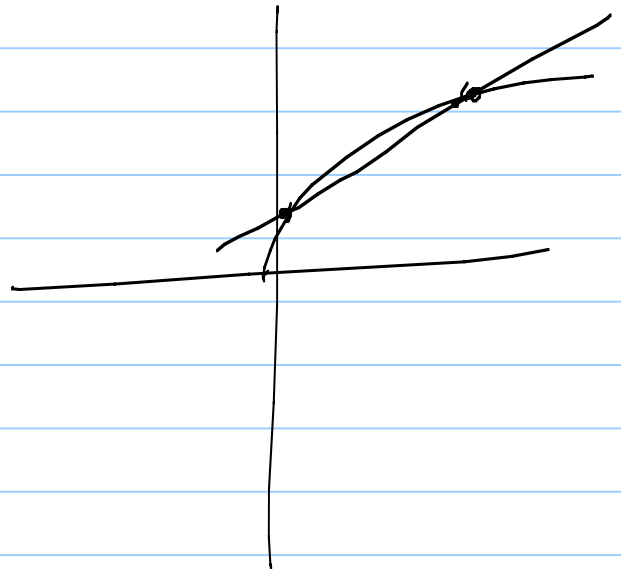
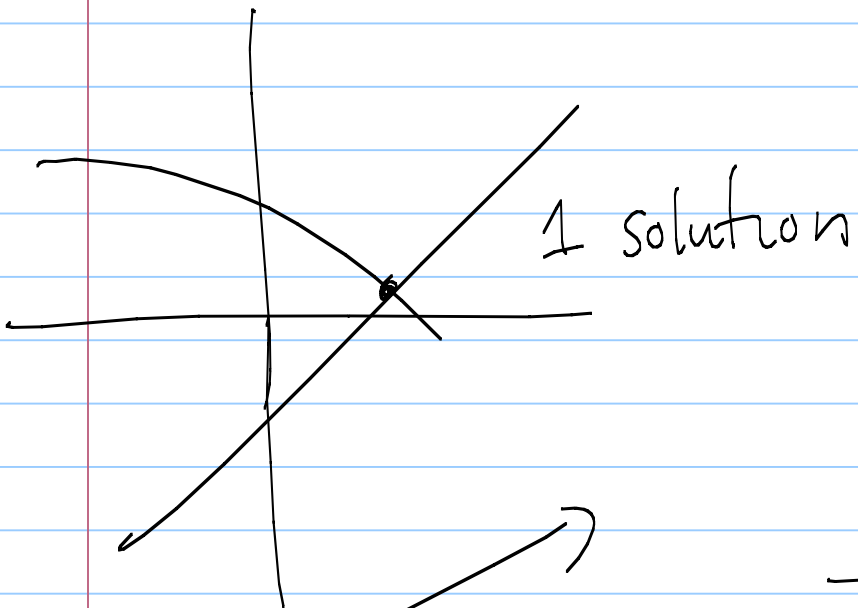
NOT

work

Only 1 solution: $x=10$

Why is it important to check answers?

$$\underline{x-2} = \underline{\sqrt{7x-6}}$$



Ⓑ You try this -- . Solve & Check :

$$x-5 = \sqrt{-x+17}$$

$$(x-5)^2 = -x+17$$

$$x^2 - 10x + 25 = -x + 17$$

$$x^2 - 9x + 8 = 0$$

$$(x-8)(x-1) = 0$$

$$x=8 \text{ or}$$
$$x=\underline{1}$$

Check: $x=8$ only works

② Equations with Absolute Value

① Solve and check your answers!

$$|-3x + 5| = 12x - 6$$

$$-3x + 5 = 12x - 6 \quad \text{or} \quad -3x + 5 = -(12x - 6)$$

$$\begin{array}{r} +3x \\ \hline -3x + 5 = 12x - 6 \end{array}$$

$$\begin{array}{r} 5 = 15x - 6 \\ +6 \qquad \qquad +6 \\ \hline 11 = 15x \end{array}$$

$$\frac{11}{15} = \frac{15x}{15}$$

$$x = \frac{11}{15}$$

or

$$\begin{array}{r} +12x \\ \hline -3x + 5 = -12x + 6 \end{array}$$

$$\begin{array}{r} 9x + 5 = 6 \\ -5 \qquad \qquad -5 \\ \hline 9x = 1 \end{array}$$

$$\frac{9x}{9} = \frac{1}{9}$$

$$x = \frac{1}{9}$$

Check: $|-3x + 5| = 12x - 6$

$$x = \frac{11}{15} \quad \left| -3\left(\frac{11}{15}\right) + 5 \right| = \left| \frac{-11}{5} + \frac{25}{5} \right| = \frac{14}{5}$$

$$\left| 2\left(\frac{11}{15}\right) - 6 \right| = \left| 4\left(\frac{11}{15}\right) - 6 \right|$$

$$= \frac{44}{15} - \frac{30}{5}$$

$$= \frac{14}{5}$$

$x = \frac{11}{15}$ works

only solution!

$$x = \frac{1}{9} \quad \left| -3x + 5 \right| = \left| 2x - 6 \right|$$

$$\left| -3\left(\frac{1}{9}\right) + 5 \right| = \left| \frac{-1}{3} + \frac{15}{3} \right| = \frac{14}{3}$$

$$x = \frac{1}{9}$$

does not
work

$$\left| 2\left(\frac{1}{9}\right) - 6 \right| = \frac{4}{9} - \frac{18}{3} = \frac{-14}{3}$$

③ Inequality with Absolute Value

$$\textcircled{1} \quad |5x + 6| \leq 5$$

$$-5 < 5x + 6 < 5$$

$$\begin{array}{r} -5 < 5x + 6 \\ \underline{-6} \quad \underline{-6} \end{array} \quad \underline{\text{and}} \quad \begin{array}{r} 5x + 6 < 5 \\ \underline{-6} \quad \underline{-6} \end{array}$$

$$\begin{array}{r} -11 < 5x \\ \underline{5} \quad \underline{5} \end{array} \quad \underline{\text{and}} \quad \begin{array}{r} 5x < -1 \\ \underline{5} \quad \underline{5} \end{array}$$

$$-\frac{11}{5} < x$$

$$x < -\frac{1}{5}$$

$$x > -\frac{11}{5}$$

and

③ Solve: $|4x - 4| > 4$

$$4x - 4 > 4$$
$$\quad \underline{+4} \quad \underline{+4}$$
$$\hline 4x > 8$$

$$4x > 8$$

$$x > 2$$

or

or

or

$$4x - 4 < -4$$
$$\quad \underline{+4} \quad \underline{+4}$$
$$\hline 4x < 0$$

$$\frac{4x}{4} < \frac{0}{4}$$

$$x < 0$$

④ Quadratic Inequalities (in textbook assignment)

① $x^2 - 6x < 2x - 12$

① Get a "0" on right side

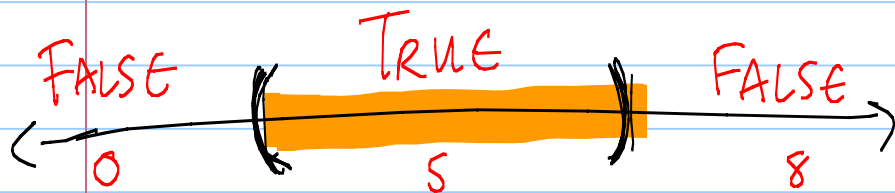
$$x^2 - 8x + 12 < 0$$

② Factor the left hand side

* $(x - 2)(x - 6) < 0$

③ Figure out what values of x give equality, plot on a # line.

$$x = \underline{2}, \underline{6}$$

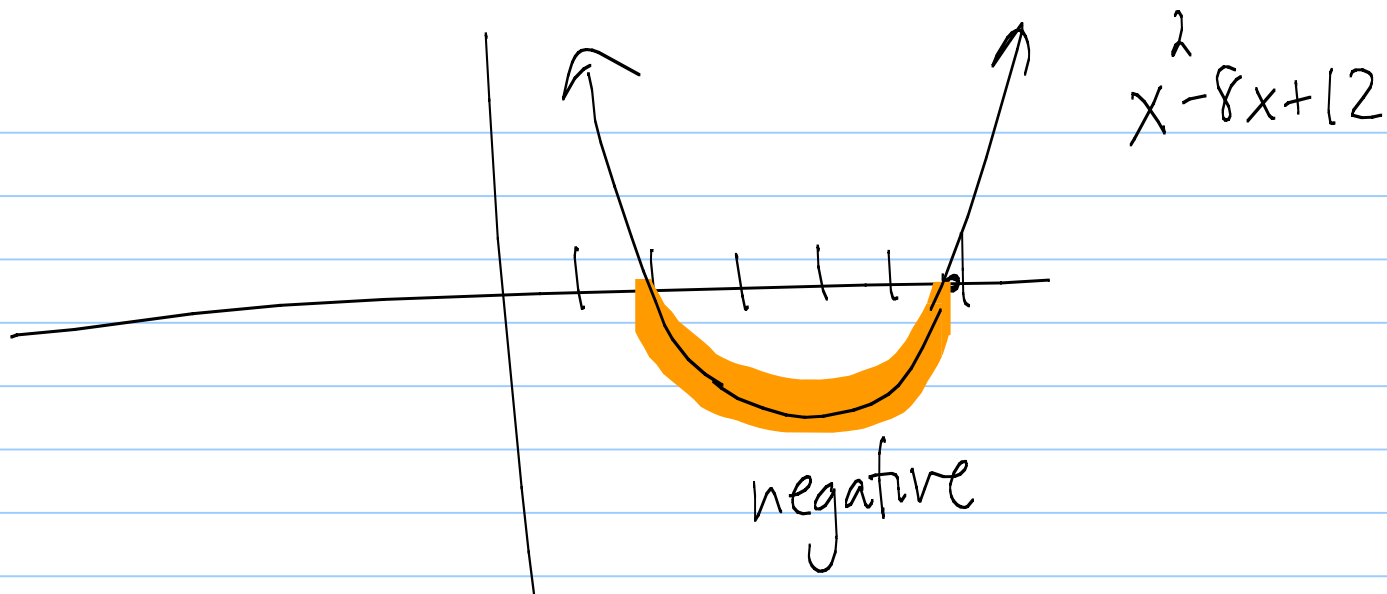


$(-2)(-6)$
 $= 12 \not< 0$

2 5
 $(3)(-1)$
 $-3 < 0$

6 8
 $(6)(2)$
 $= 12 \not< 0$

Solution: $2 < x < 6$



Ex) Solve: $2x^2 - 4x \geq 2 - x$

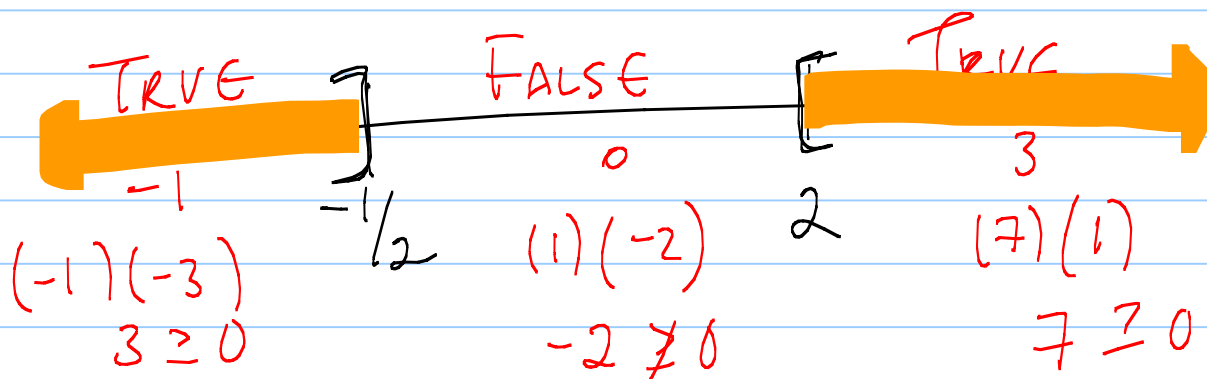
$\frac{\quad + x \quad}{\quad}$
 $\frac{\quad + x \quad}{\quad}$

$2x^2 - 3x \geq 2$

$\frac{\quad - 2 \quad}{\quad}$
 $\frac{\quad - 2 \quad}{\quad}$

$2x^2 - 3x - 2 \geq 0$

$(2x + 1)(x - 2) \geq 0$



Solution: $x \leq -\frac{1}{2}$ or $x \geq 2$