

1. Solve $x^2 - 6x - 16 = 0$ by three methods:

a. Factoring

$$1 \ x^2 - 6x - 16$$

$$(1)(-16) = -16$$

Factors of -16

that add to -6: $(-8)(2) = -16$ ✓

$$-8 + 2 = -6$$

$$(x-8)(x+2) = 0$$

$$x = 8 \text{ OR } x = -2 \rightarrow x \in \{8, -2\} \text{ is solution set}$$

b. Completing the Square

$$x^2 - 6x = 16$$

$$x^2 - 6x + 3^2 = 16 + 9$$

$$(x-3)^2 = 25$$

$$x-3 = \pm \sqrt{25} = \pm 5$$

$$x = 3 \pm 5$$

$$\rightarrow x \in \{-2, 8\}$$

$$\frac{6}{2} = 3 \rightarrow 3^2 = 9$$

c. Quadratic Formula

$$a = 1, b = -6, c = -16$$

$$b^2 - 4ac = (-6)^2 - 4(1)(-16)$$

$$= 36 + 64$$

$$= 100$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{+6 \pm \sqrt{100}}{2(1)} = \frac{6 \pm 10}{2}$$

$$\frac{16}{2} = 8$$

$$\frac{-4}{2} = -2$$

$$\Rightarrow x \in \{-2, 8\}$$

2. Solve the compound inequalities and absolute value inequalities

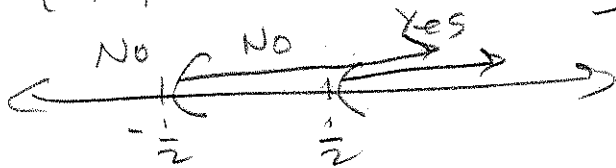
a. $-2x+5 < 4$ and $\frac{2x+1}{3} > 0$

$$-2x < -1 \quad \& \quad 2x+1 > 0$$

$$x > -\frac{1}{2} = \frac{1}{2} \quad \& \quad 2x > -1$$

$$x > -\frac{1}{2}$$

$$\left\{ x \mid x > \frac{1}{2} \text{ and } x > -\frac{1}{2} \right\} = \left(\frac{1}{2}, \infty \right)$$

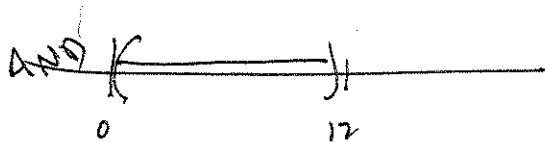


b. $|6-x| < 6$

$$6-x < 6 \quad \text{AND} \quad 6-x > -6$$

$$-x < 0 \quad \text{AND} \quad -x > -12$$

$$\left\{ x \mid x > 0 \quad \text{AND} \quad x < 12 \right\} = (0, 12)$$



c. $3|x-2|+6 \geq 9$

$$3|x-2| \geq 3$$

$$|x-2| \geq 1$$

$$x-2 \geq 1 \quad \text{OR} \quad x-2 \leq -1$$

$$\left\{ x \mid x \geq 3 \quad \text{OR} \quad x \leq 1 \right\} = (-\infty, 1] \cup [3, \infty)$$

