

**Instructions:** Show all work. Answers without work will not receive full credit. Give exact answers unless specifically asked to round.

1. Solve each of the following inequalities below and write the answer in each of the following formats: i) set notation, ii) on a number line, iii) in interval notation.

a.  $3y - (5y + 2) > 4(y + 1) - 2y$

$$3y - 5y - 2 > 4y + 4 - 2y$$

$$-2y - 2 > 2y + 4$$

$$\begin{array}{r} -2y \phantom{-2} \\ -2y \phantom{-2} \\ \hline -4y - 2 > 2y + 4 \end{array}$$

$$\begin{array}{r} -4y - 2 > 2y + 4 \\ +2 \phantom{-2} \phantom{+2} \\ \hline -4y > 6 \end{array}$$


$$-4y > 6$$

$$\frac{-4y}{-4} > \frac{6}{-4}$$

flip

$$y < -\frac{3}{2}$$

Set:  $\{y \mid y < -\frac{3}{2}\}$

line: 

interval:  $(-\infty, -\frac{3}{2})$

b.  $4(x - 1) > 3(x - 1) + x$


$$4x - 4 > 3x - 3 + x$$

$$\begin{array}{r} 4x - 4 > 4x - 3 \\ -4x \phantom{-4} \\ -4x \phantom{-4} \\ \hline -4 > -3 \end{array}$$

$$-4 > -3$$

this is false  $\emptyset$   
no solutions

Set:  $\emptyset$

line:  (empty)

interval: none

c.  $5(x - 2) < 3(x + 1) + 2x$


$$5x - 10 < 3x + 3 + 2x$$

$$\begin{array}{r} 5x - 10 < 5x + 3 \\ -5x \phantom{-10} \\ -5x \phantom{-10} \\ \hline -10 < 3 \end{array}$$

$$-10 < 3$$

this is always true  
all reals.

Set:  $\{x \mid x \text{ is a real \#}\}$

line:  (filled in)

interval:  $(-\infty, \infty)$


d.  $\frac{x}{3} \geq 2 + \frac{x}{6}$  ) 6

$$\frac{6x}{3} \geq 12 + \frac{6x}{6}$$

$$\begin{array}{r} 2x \geq 12 + x \\ -x \phantom{\geq 12} \\ -x \phantom{\geq 12} \\ \hline x \geq 12 \end{array}$$

$$x \geq 12$$

Set:  $\{x \mid x \geq 12\}$

line: 

interval:  $[12, \infty)$