

2.7: Inequalities (cont'd)

Note Title

2/5/2015

Example: Solve.

$$6(3-x) > 2 - (3x+1)$$

$$18 - 6x > 2 - 3x - 1$$

$$18 - 6x > -3x + 1$$

$$18 - 6x + 3x > 1 - 18$$

$$-3x > 1 - 18$$

$$-3x > -17$$

Reverse the
direction of
the inequality
sign

$$\frac{-3x}{-3} < \frac{-17}{-3}$$

$$x < \frac{17}{3}$$

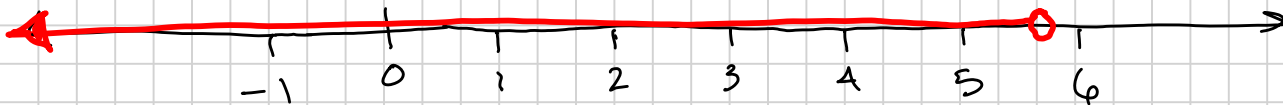
or, equivalently $17 > 3x$

$$\frac{17}{3} > \frac{3x}{3}$$

$$\frac{17}{3} > x$$

Rewrite:

$$x < \frac{17}{3}$$



$$x < \frac{17}{3}$$

$$x < 5 \frac{2}{3}$$

Combined inequalities

Ex: Solve. (Find the values that make the statement true)

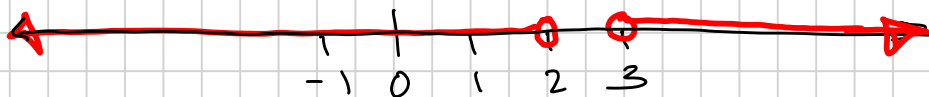
$$3x < 6 \quad \text{or} \quad 5x > 15$$

$$\frac{3x}{3} < \frac{6}{3}$$

$$\frac{5x}{5} > \frac{15}{5}$$

$$x < 2 \quad \text{or} \quad x > 3$$

answer.



Example: Solve.

$$-6 \leq 2x+1 < 17$$

This means: $-6 \leq 2x+1$ and $2x+1 < 17$

$$-7 \leq 2x$$

$$2x < 16$$

$$\frac{-7}{2} \leq \frac{2x}{2}$$

$$\frac{2x}{2} < \frac{16}{2}$$

$$-\frac{7}{2} \leq x$$

$$x < 8$$

$$-3\frac{1}{2} \leq x$$

and

$$x < 8$$

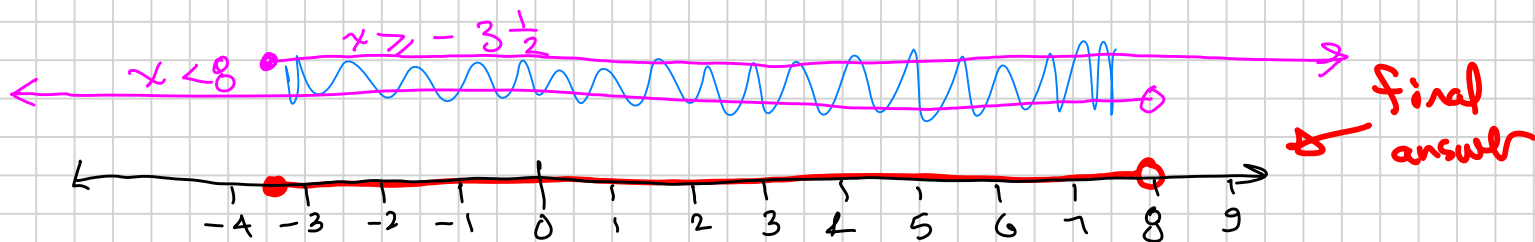
$$x \geq -3\frac{1}{2}$$

and

$$x < 8$$

Rewrite into a combined inequality:

$$\boxed{-3\frac{1}{2} \leq x < 8}$$



We could leave it as a combined inequality when we solve it:

$$-6 \leq 2x+1 < 17$$

[subtract 1 from all 3 sides]

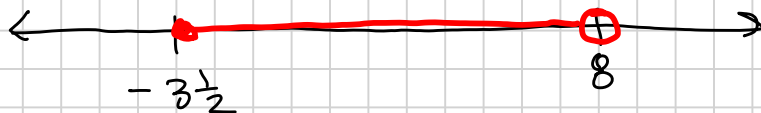
$$-7 \leq 2x < 16$$

$$\frac{-7}{2} \leq \frac{2x}{2} < \frac{16}{2}$$

[Divide all 3 sides by 2]

$$-\frac{7}{2} \leq x < 8$$

$$\boxed{-3\frac{1}{2} \leq x < 8}$$



Ex: $-2 < 5 - 3x \leq 8$

$$-7 < -3x \leq 3$$

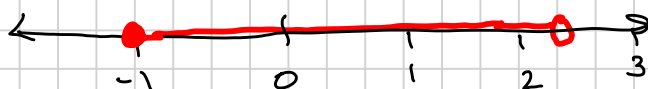
$$\frac{-7}{-3} > \frac{-3x}{-3} \geq \frac{3}{-3}$$

$$\frac{7}{3} > x \geq -1$$

$$2\frac{1}{3} > x \geq -1$$

$$-1 \leq x < 2\frac{1}{3}$$

[Reverse both inequality signs]



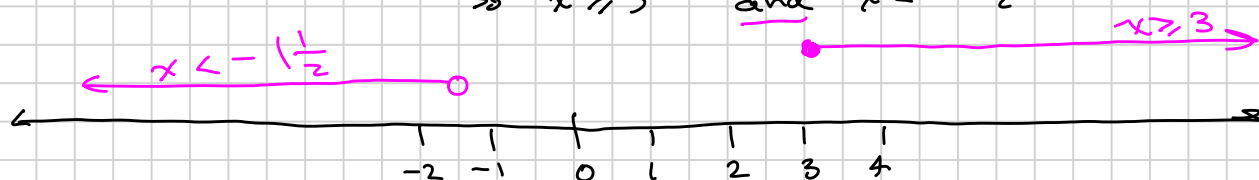
Ex: Solve $3 \leq 2x - 3 < -6$

$$6 \leq 2x < -3$$

$$\frac{6}{2} \leq \frac{2x}{2} < \frac{-3}{2}$$

$$3 \leq x < -1\frac{1}{2}$$

This means $3 \leq x$ and $x < -1\frac{1}{2}$
 so $x \geq 3$ and $x < -1\frac{1}{2}$



Solution Set:

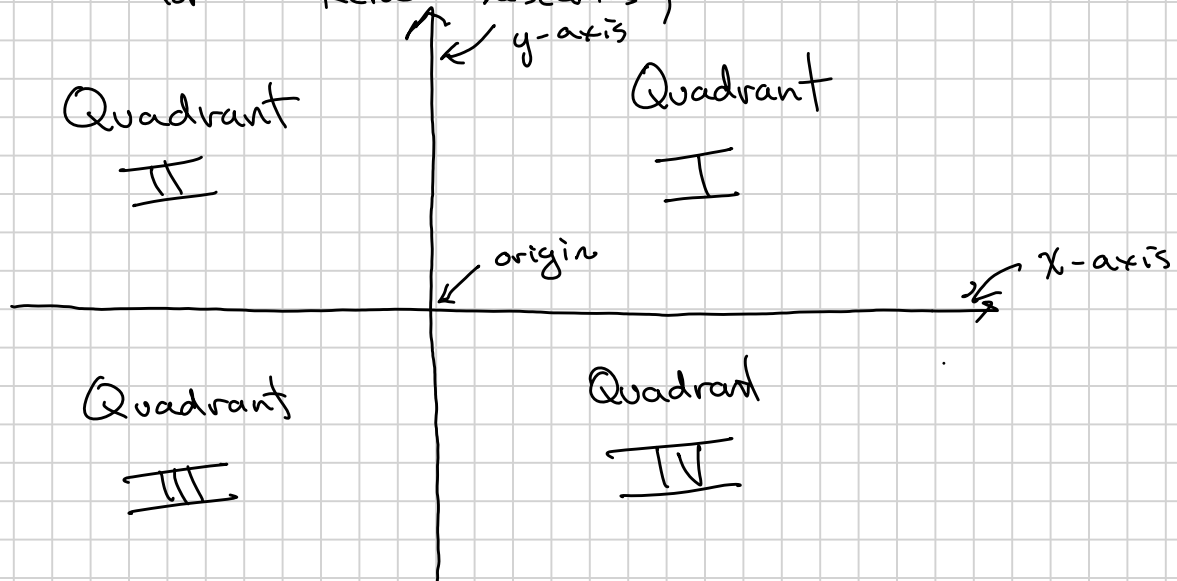
No Solution

Correct number line: (nothing on it)

3.1: The Rectangular Coordinate System

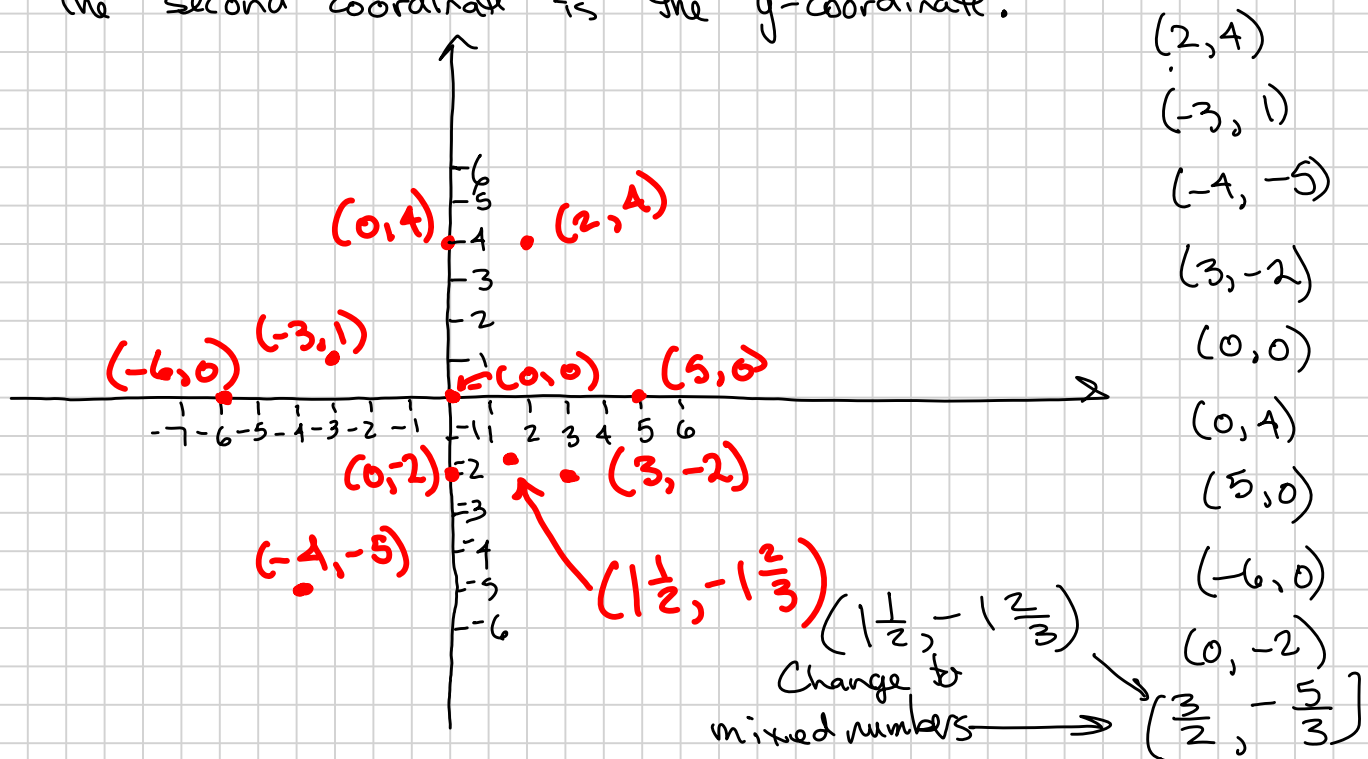
(also called the Cartesian coordinate system, the Cartesian plane, or xy -plane)

(named for René Descartes)



Example: Plot these points.

(x, y) : This is a point, or ordered pair.
The first coordinate is the x -coordinate.
The second coordinate is the y -coordinate.



3.2: Solutions and graphs of linear equations (in 2 variables)

An linear equation in 2 variables can be written as $Ax + By = C$, where A, B, C are real numbers

A solution to a linear equation is an ordered pair that makes the equation true. (when the values in the ordered pair are substituted, you get a true statement)

Ex: Is $(4, 6)$ a solution to $3x - 2y = 1$?

$$\underline{x=4, y=6} \quad 3(4) - 2(6) = 1$$

$$12 - 12 = 1$$

$$0 = 1 \quad \text{False}$$

So No, $(4, 6)$ is not a solution.

Is $(5, 7)$ a solution to $3x - 2y = 1$?

$$\underline{x=5, y=7} \quad 3(5) - 2(7) = 1$$

$$15 - 14 = 1$$

$$1 = 1 \quad \text{True}$$

Yes, this is a solution

Is $(1, 1)$ a solution? $3(1) - 2(1) = 1$ Yes!

$(7, 10)$ a solution $3(7) - 2(10) = 1$

$$21 - 20 = 1$$

$$1 = 1 \quad \text{True Yes!}$$

Take-Home
Quiz (turn in next class).

Plot the 3 solutions we found, along with any other solutions you can think of.