

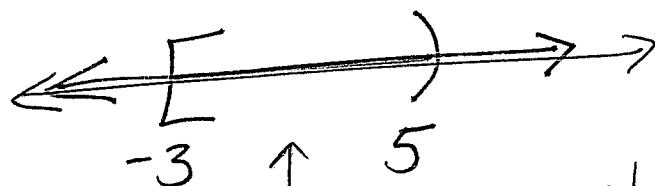
MAT 050, Compound Inequalities HW

Solve and graph the following compound inequalities. Clearly indicate what your final solution set is, in set builder or interval notation, and on your graph.

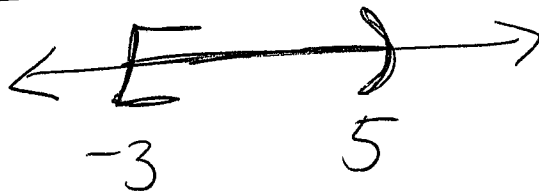
1. $x < 5$ and $x \geq -3$
2. $x \geq 7$ and $x < 19$
3. $x < 4$ and $x \leq -3$
4. $x > 4$ and $x < 0$
5. $-2x > 8$ and $x + 10 > 3$
6. $x > 5$ or $x \leq -3$
7. $x \leq 7$ or $x > 19$
8. $x < 4$ or $x \leq -3$
9. $x < 4$ or $x < 0$
10. $x + 3 \leq 10$ or $-2x + 8 < -10$
11. $-5 \leq x - 2 < 12$
12. $7 < 3x \leq 9$
13. $-2 < 3x - 8 \leq 13$
14. $2 \leq -x < 9$
15. $-4 < -2x < 12$
16. $-10 \leq -6x + 2 \leq 8$

means "intersection"
or "overlap"

1) $x < 5$ and $x \geq -3$



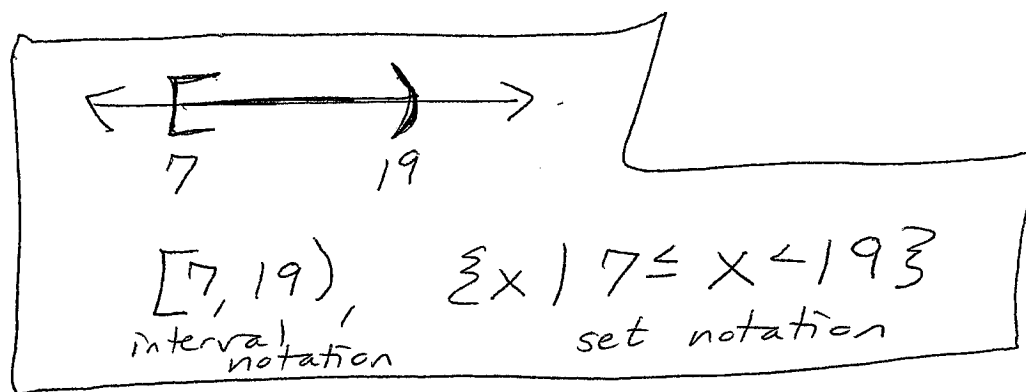
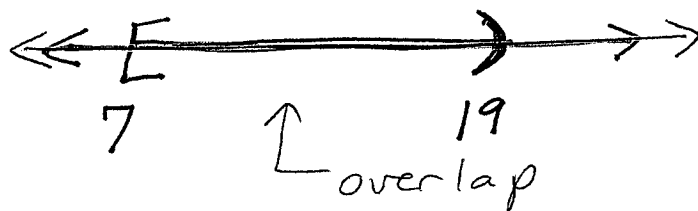
overlap between
the two numbers



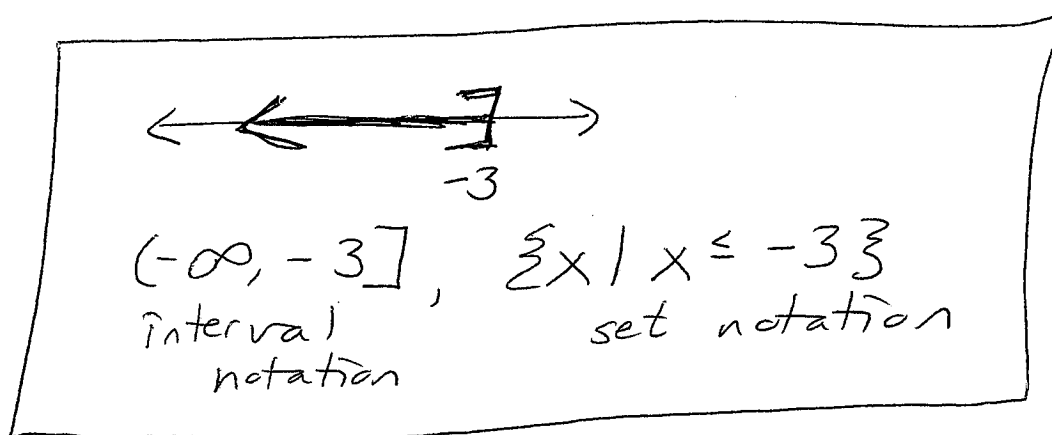
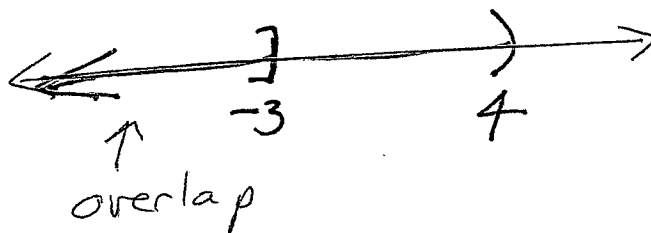
$[-3, 5)$ interval notation

$\{x \mid -3 \leq x < 5\}$ set notation

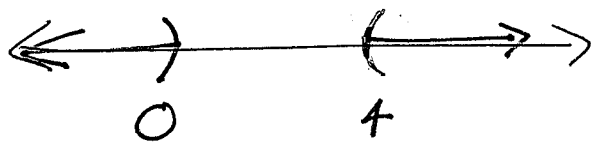
2) $x \geq 7$ and $x < 19$ ^{means "overlap"}



3) $x < 4$ and $x \leq -3$



4) $x > 4$ and $x < 0$

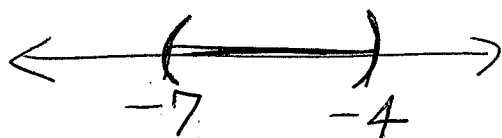
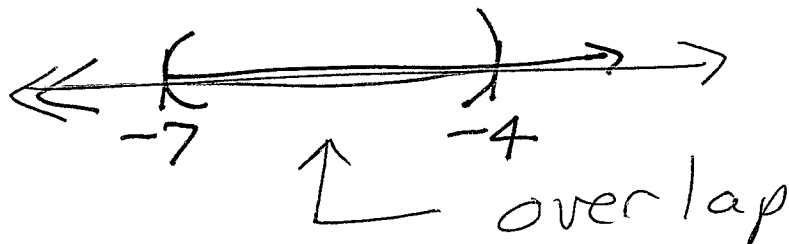


no overlap

solⁿ: no solⁿ, the empty set,
 $\emptyset, \{ \}$

5) $\frac{-2x > 8}{\frac{-2}{-2} \downarrow \frac{-2}{-2}}$ and $\frac{x+10 > 3}{-10 \quad -10}$

$x < -4$ and $x > -7$

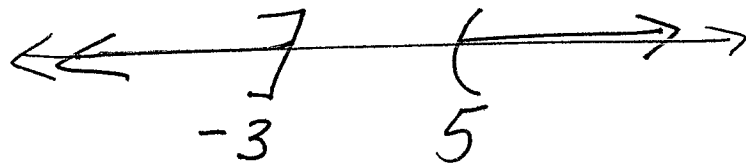


$(-7, -4)$
 interval
 notation

$\{x \mid -7 < x < -4\}$
 set notation

6) $x > 5$ or $x \leq -3$

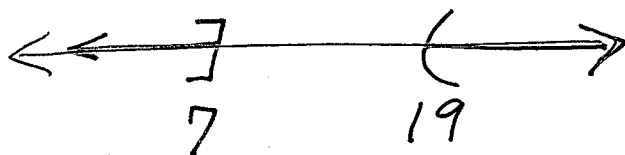
$\cup$ means "union" or
"everything that is shaded"



two "branches" are shaded,
so this graph is the solution

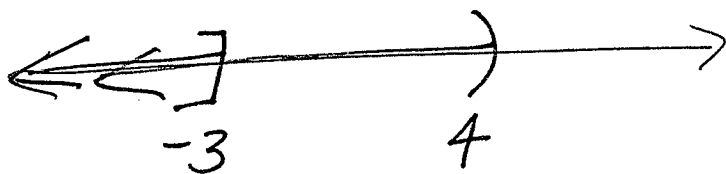
$(-\infty, -3] \cup (5, \infty)$, $\{x \mid x \leq -3 \text{ or } x > 5\}$
interval notation set notation

7) $x \leq 7$ or $x > 19$

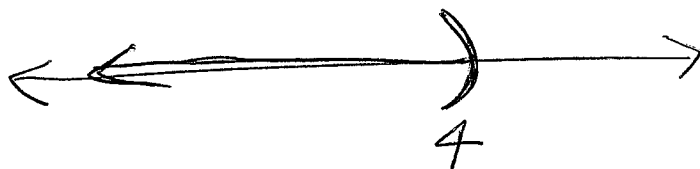


$(-\infty, 7] \cup (19, \infty)$, $\{x \mid x \leq 7 \text{ or } x > 19\}$
interval notation set notation

8) $x < 4$ or $x \leq -3$



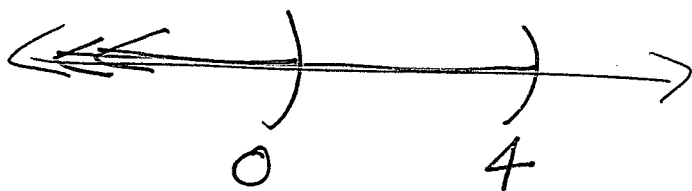
all of this is shaded



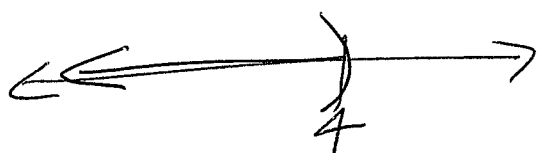
$(-\infty, 4)$
interval
notation

$\{x \mid x < 4\}$
set notation

9) $x < 4$ or $x < 0$



all this is shaded

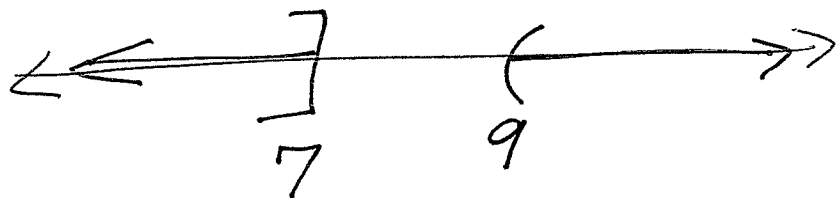


$(-\infty, 4)$
interval
notation

$\{x \mid x < 4\}$
set notation

$$10) \quad \begin{array}{r} x+3 \leq 10 \\ -3 \quad -3 \\ \hline x \leq 7 \end{array} \quad \text{or} \quad \begin{array}{r} -2x+8 < -10 \\ -8 \quad -8 \\ \hline -2x < -18 \\ \frac{-2x}{-2} < \frac{-18}{-2} \\ \downarrow \\ x > 9 \end{array}$$

$\parallel$

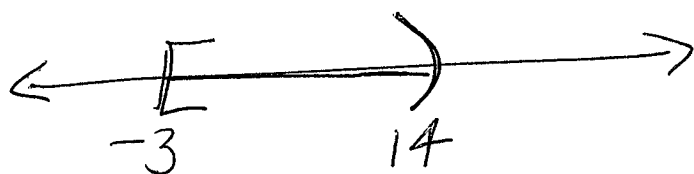


$(-\infty, -7] \cup (9, \infty)$
interval notation

$\{x \mid x \leq -7 \text{ or } x > 9\}$
set notation

$$11) \quad \begin{array}{r} -5 \leq x-2 < 12 \\ +2 \quad +2 \quad +2 \\ \hline \end{array}$$

$\{x \mid -3 \leq x < 14\}$ set notation



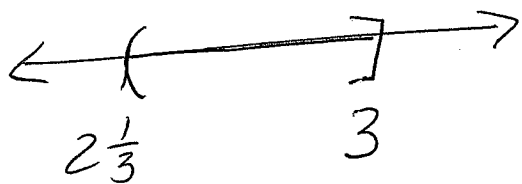
$[-3, 14)$ interval notation

$$12) \quad \frac{7}{3} < \frac{3x}{3} \leq \frac{9}{3}$$

$$\frac{7}{3} < x \leq 3$$

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

set notation



$$(2\frac{1}{3}, 3]$$

interval notation

mixed #'s are easier
to graph than
improper fractions

$$13) \quad \begin{array}{ccccc} -2 & < & 3x - 8 & \leq & 13 \\ +8 & & +8 & & +8 \end{array}$$

$$\frac{6}{3} < \frac{3x}{3} \leq \frac{21}{3}$$

$$\{x \mid 2 < x \leq 7\}$$

set notation



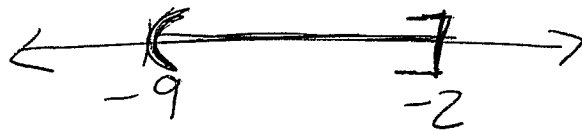
$$(2, 7]$$

interval notation

$$14) \quad \begin{array}{ccc} 2 \leq -x < 9 \\ \frac{2}{-1} & \frac{-x}{-1} & \frac{9}{-1} \\ \downarrow & & \downarrow \end{array}$$

$$\{x | -2 \geq x > -9\} \text{ or } \{x | -9 < x \leq -2\}$$

set notation

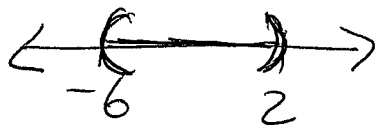


$$(-9, -2] \text{ interval notation}$$

$$15) \quad \begin{array}{ccc} -4 < -2x < 12 \\ \frac{-4}{-2} & \frac{-2x}{-2} & \frac{12}{-2} \\ \downarrow & & \downarrow \end{array}$$

$$\{x | 2 > x > -6\} \text{ or } \{x | -6 < x < 2\}$$

set notation

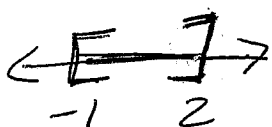


$$(-6, 2) \text{ interval notation}$$

$$16) \quad \begin{array}{ccc} -10 \leq -6x + 2 \leq 8 \\ \frac{-10}{-2} & \frac{-6x + 2}{-2} & \frac{8}{-2} \\ \hline \frac{-12}{-6} & \frac{-6x}{-6} & \frac{6}{-6} \\ \downarrow & & \downarrow \end{array}$$

$$\{x | 2 \leq x \leq -1\} \text{ or } \{x | -1 \leq x \leq 2\}$$

set notation



$$[-1, 2] \text{ interval notation}$$