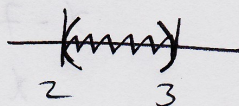


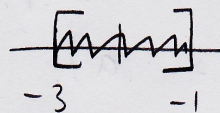
1.5 Solving Inequalities

p.1

The open interval $(2,3)$ is the set of x -values $2 < x < 3$



The closed interval $[-3,-1]$ is the set $-3 \leq x \leq -1$



3 Notations :

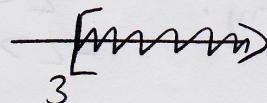
Interval $(1,2)$

Inequality $1 < x < 2$

Set $\{x \mid 1 < x < 2\}$

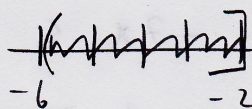
We use open brackets for $\pm \infty$

$[3, \infty)$ is the set $x \geq 3$

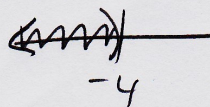


Ex: Write as an inequality and graph

a) $(-6, -2]$
 $-6 < x \leq -2$



b) $(-\infty, -4)$
 $x < -4$



Operations on Inequalities

p. 2

Can add to / subtract from both sides

Ex: $2x - 7 < x + 13$

$$x - 7 < 13$$

$$x < 20$$

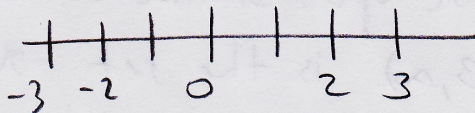
Can multiply / divide by a positive #

Ex: a) $2x \geq 30$
 $x \geq 15$

b) $\frac{x}{3} < 2$
 $x < 6$

Multiplying / dividing by a negative #
reverses the inequality!

Why? $2 < 3$
 $-2 > -3$



Ex: Solve

a) $5 - 7x \leq 54$

$$-7x \leq 49$$

$$x \geq -7$$

reverses

$$b) \frac{-x}{2} > 5$$

$$x < -10$$

reverses

p. 3

$$c) 3x + 3 < 19 + x$$

$$2x + 3 < 19$$

$$2x < 16$$

$$x < 8$$

Ex: Solve

$$a) 3 < 7x - 4 \leq 10$$

$$7 < 7x \leq 14$$

$$1 < x \leq 2$$

$$b) -2 < \frac{4-2x}{3} < 8$$

$$-6 < 4-2x < 24$$

$$-10 < -2x < 20$$

$$5 > x > -10$$

reverses

rewrite $-10 < x < 5$

Ex: Rewrite $3 < x < 4$ in the form $a < 2x+7 < b$ p.4

$$3 < x < 4$$

$$6 < 2x < 8$$

$$13 < 2x+7 < 15$$

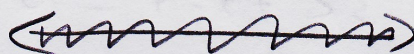
For any real # a , $a^2 \geq 0$

Ex: Solve and graph

$$x^2 \geq -1$$

all real x -values

$$(-\infty, \infty)$$



Reciprocal Property

a and $\frac{1}{a}$ have the same sign
($a \neq 0$)

Ex: If $5x+3 > 0$ then $\frac{1}{5x+3} > 0$

If $\frac{1}{9x-1} < 0$ then $9x-1 < 0$

Ex: Solve

$$(8x-3)^{-1} > 0$$

$$\frac{1}{8x-3} > 0$$

$$8x-3 > 0 \quad (\text{Reciprocal Property})$$

$$8x > 3$$

$$x > \frac{3}{8}$$

Ex: A long-distance call costs \$2 plus 13¢ per minute. How many minutes yield a cost between \$3.43 and \$10.06? p.5

$m = \# \text{ minutes}$

$C = \text{cost (\$)}$

$$C = 2 + 0.13m$$

$$3.43 \leq C \leq 10.06$$

$$3.43 \leq 2 + 0.13m \leq 10.06$$

$$1.43 \leq 0.13m \leq 8.06$$

$$\frac{1.43}{0.13} \leq m \leq \frac{8.06}{0.13}$$

$$11 \leq m \leq 62$$

Between 11 and 62 minutes.