

Absolute Value Inequalities Notes

$<$
 \leq less thAND

$>$
 \geq greatOR

Solve and write solution in interval notation.

a) $|2x+7| < 11$ less thAND

$$2x+7 < 11 \quad 2x+7 > -11$$

$$2x < 4 \quad 2x > -18$$

$$x < 2 \quad \underline{\text{and}} \quad x > -9$$

$(-9, 2) \quad -9 < x < 2$

b) $|3x-2| \geq 8$ greatOR

$$3x-2 \geq 8 \quad 3x-2 \leq -8$$

$$\frac{3}{3}x \geq \frac{10}{3} \quad \frac{3}{3}x \leq \frac{-6}{3}$$

$$x \geq 10/3 \quad \underline{\text{or}} \quad x \leq -2$$

$(-\infty, -2] \cup [10/3, \infty)$
 $x \leq -2 \text{ or } x \geq \frac{10}{3}$

c) $|x+4| - 1 > 6x$ greatOR

$$|x+4| > 6x+1$$

$$x+4 > 6x+1 \quad x+4 < -6x-1$$

$$\frac{3}{5} > \frac{5}{3}x \quad \frac{1}{7}x < \frac{-5}{7}$$

$$x < \frac{3}{5} \quad \text{or} \quad x < \frac{-5}{7}$$

$(-\infty, \frac{3}{5})$

d) $|x+3| < -2$

not possible
so... **no solution!**

NO overlap

e) $|x+3| \geq 0$ greatOR

$$x+3 \geq 0 \quad x+3 \leq 0$$

$$x \geq -3 \quad \underline{\text{or}} \quad x \leq -3$$

$(-\infty, \infty)$

f) $|4+x| < 1-2x$ less thAND

$$4+x < 1-2x \quad 4+x > -1+2x$$

$$3x < -3 \quad 5 > x$$

$$x < -1 \quad \underline{\text{and}} \quad x < 5$$

$(-\infty, -1) \quad x < -1$

g) $|x-4| > 3$ greatOR

$$x-4 > 3 \quad x-4 < -3$$

$$x > 7 \quad \underline{\text{or}} \quad x < 1$$

$(-\infty, 1) \cup (7, \infty)$

h) $|x+2| \leq 4$ less thAND

$$x+2 \leq 4 \quad x+2 \geq -4$$

$$x \leq 2 \quad \underline{\text{and}} \quad x \geq -6$$

$[-6, 2]$