MAT 104 Quiz 4

Wednesday, September 15, 2004

1. Solve the inequality below and write your answer in set builder notation.

$$(x-3) < -2(x+2) \leq x$$

Split this compound inequality into the two inequalities

$$x-3 < -2(x+2) \text{ and } -2(x+2) \leq x$$

The first inequality is

$$\begin{aligned} x-3 < -2(x+2) \quad &\iff \quad x-3 < -2x-4 \\ &\iff \quad 3x < -1 \\ \iff \quad & x < -\tfrac{1}{3} \end{aligned}$$

and the second inequality is

$$\begin{aligned} -2(x+2) \leq x \quad &\iff \quad -2x-4 \leq x \\ &\iff \quad -4 \leq 3x \\ &\iff \quad -\frac{4}{3} \leq x \\ &\iff \quad x \geq -\frac{4}{3} \end{aligned}$$

In set builder notation, the solution set is

$$\left\{ x \mid -\frac{4}{3} \leq x < -\frac{1}{3} \right\}$$

2. Write your answer in interval notation.

$$\left[-\frac{4}{3}, -\frac{1}{3} \right)$$

3. Indicate your solution on the number line below.