Sometimes we are told that one quantity is less than, not equal to, another. What will that mean? College Algebra Class Notes Solving Linear Inequalities, Interval Notation, and Domain (section 1.6)

## **Solving Linear Inequalities**

Solving linear inequalities is identical to solving linear equations, *except* when you do what? Let's see if it comes up in these examples.

expl 1: Solve the inequality. Then check your solution by substituting a value from the solution set into the original inequality. Does it work? If not, why not? 0

-9x < 81

expl 2: Solve the inequality. Then check your solution by substituting a value from the solution

$$\frac{x}{3} \ge 12$$

expl 3: Solve the inequality. Write your answer in interval notation. ° () 9x + 13 < 3x - 5

set into the original inequality. Does it work? If not, why not?

Do you remember how to graph these solutions?

Do you remember the hitch when you divide or multiply an inequality by a negative? What needs to be done?

expl 4: Solve the inequality. Write your answer in interval notation.  $-20 < 10 - 3x \le 1$ 



## **Review of Interval Notation:**

Do you remember interval notation? Fill in the third column for these sets of numbers. The real number line graphs can help visualize the sets.



Inequality Notation	Graph on Number Line	Interval Notation
$-2 < x \le 5$ °	$-2  0 \qquad 5$	
<i>x</i> < 3	$\begin{array}{c c} \bullet & \bullet \\ \bullet & \bullet \\ 0 & 3 \end{array}$	
<i>x</i> ≤ 3		
x > 3		
$x \ge 3$		
Do you remember $x   x < 3$	smallest largest number number in set in set	square bracket: includes endpoint parenthesis: does not include endpoint

## **Domain:**

This is a topic we will look at a lot during the semester but we start with these examples. First, let's be sure we know what we are talking about.

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*x*-values: inputs *y*-values: outputs

**Definition: Domain:** the set of all x values (that will give you a real number out for y)

So, what does that mean? Consider the relationship  $y = \frac{5}{x+3}$ 

Many x values will give you a real number out for y. But there is one value, that when substituted in for x, will give you garbage. What is it? Why does it result in garbage?

The domain of this relationship is everything else. Write it in words and then in interval notation. Can you write the domain in set builder notation too?

expl 5: What is the domain of the relationship  $y = \sqrt{3+2x}$ ? Write it in words and then in interval notation.

The thing under the radical *has to be* greater than or equal to zero.
Make and solve this inequality.

expl 6: What is the domain of the relationship  $y = \frac{14}{\sqrt{6+x}}$ ? Write it in words and then in interval notation. What, now, is true of the number "6 + x"?