***2.5 Inequalities***

* $c<d$ 🡪 *c* is less than *d* 🡪 *c* is to the left of *d* on the number line
* $c>d$🡪 *c* is less than *d* 🡪 *c* is to the right of *d* on the number line
* $c<d and d>c$ are equivalent, and both mean that $d-c$ is positive:

Ex:

* $b<c<d$ is a compound inequality which means $b<c$ and $c<d$

Interval Notation with illustrations:

$\left[c,d\right]$ denotes the set of all real numbers *x* such that $c\leq x\leq d$

$\left(c, d\right)$ denotes the set of all real numbers *x* such that ­­­\_\_\_\_\_\_\_\_\_\_\_

$[c,d)$ denotes the set of all real numbers *x* such that \_\_\_\_\_\_\_\_\_\_\_\_

$(c, d\}$ denotes the set of all real numbers *x* such that \_\_\_\_\_\_\_\_\_\_\_

$[b, \infty )$ denotes the set of all real numbers *x* such that­­­­­­\_\_\_\_\_\_\_\_\_\_\_

$(b,\infty )$ denotes the set of all real numbers *x* such that \_\_\_\_\_\_\_\_\_\_

$(-\infty ,b]$ denotes the set of all real numbers *x* such that \_\_\_\_\_\_\_\_\_\_

$(-\infty , b)$ denotes the set of all real numbers *x* such that ­­­­­\_\_\_\_\_\_\_\_\_\_

$(-\infty , \infty )$ denotes the set of all real numbers *x* such that ­­­­­\_\_\_\_\_\_\_\_\_\_

***Solving Inequalities using Algebraic or Graphical Methods:***

*Algebraic Method:* You can add or subtract any number from both sides of the inequality. Likewise you can multiply or divide any **positive** number.

\*Multiplying or dividing a **negative** number means you have to *reverse the direction of the inequality.*

**Example 1:** Solving a Compound Linear Inequality

**Example 2:** Solving a Compound Linear Inequality

**­**

**Solving Other Non-Linear Inequalities**

* The solutions of an inequality of the form $f(x)<g(x)$ {$f(x)>g(x)$} consist of intervals on the x-axis where the graph of *f* is below {above} the graph of *g*

Picture Example:

* The solutions of an inequality of the form $f\left(x\right)-g(x)>0$

{$f\left(x\right)-g(x)<0$} consist of intervals on the x-axis where the graph is above {below} the axis.

Picture Example:

**Example 3: Solving an Inequality**

***Solving Quadratic and Factorable Inequalities***

**Example 4: Solving a Quadratic Inequality**

**Example 5: Solving a Factorable Inequality**

**Summary:**

1. Write the inequality with zero on one side:
2. Find the zeros of the function
3. Find the interval, or intervals, on the x-axis where the graph of the function is above (or below) the x-axis