**Algebra 2**

**Lesson 3-3: Systems of Inequalities**

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A **linear inequality** divides a graph into two regions – one that will contain only true solutions and one that will contain only false solutions. The **boundary line** that divides both regions may, at times, be a part of the solution.

**Review:**

Rules to remember when graphing inequalities and absolute values:

First and foremost: ALWAYS SOLVE FOR Y AND THEN GRAPH USING SLOPE INTERCEPT!!!

1. Inequalities with a is drawn as a dotted line.
2. Inequalities with a is drawn as a solid line.
3. Inequalities with a are shaded downward.
4. Inequalities with a are shaded upward.

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| **Example:**  Graph    This line is dotted and shaded down. Check: Pick (0,0); and plug values in. You get, a true statement. | **Example:** Graph    This line is solid and shaded right. Check: Pick (0,0); plug into equation. You get a false statement, thus, you shade on the other side of the line. Pick a point there and check. |

A simple way to check a graph is to pick a point (x,y) not on the line, but found in the shaded region. Plug it into the given equation. If the result is a true statement, then you have shaded the graph correctly.

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| Now consider two inequalities in the same coordinate grad. The solution in such cases is the area that both equations have in common – overlap.  Graph:     |  |  |  |  | | --- | --- | --- | --- | | **Example:** Graph: |  |  |  | | equal sign:  solid line | >/=  shade up | no equal  dashed | <  shade down |   A *table helps to organize facts so you don’t mess up!*  Notice that one line is solid and the other is dotted. Also notice the common solution area is double shaded. |  |

You can graph as many linear inequalities on a single graph as you need. Notice: the common area shrinks or gets “shaved” by succeeding inequalities. A system of four linear inequalities is sometimes called a linear programming problem. More on this idea in Section 3-4!!

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| **Example:** Graph the system of inequalities  *What happens to the solution area when you add more equations?*  To check the system you pick a point inside the common area. Put these (x,y) coordinates into each of the four equations. You should get four true statements. |  |

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| Solve: |  |
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