

Math 141 Key Topics: 3.1-3.3

Section 3.1

Graphing Inequalities

- For each inequality, replace the inequality sign with an equal sign and graph the line. Use a dashed line if the inequality is $<$ or $>$. Use a solid line if the inequality is \leq or \geq .
- Pick a test point in one of the regions and plug it into the inequality to see if it makes the inequality true. If it makes the inequality TRUE, then this region IS part of the solution. If it makes the inequality FALSE, then this region is NOT part of the solution.
- The solution set to a system of inequalities is the region that makes every inequality TRUE, called the **feasible region** or **feasible set**. Shade this region as required.

Some instructors want you to shade the true region, other instructors want you to shade the false region (called reverse shading). Be aware of what your instructor requires. In all cases, label the feasible region.

- A solution set is **bounded** if it can be enclosed by a circle. Otherwise, it is **unbounded**.

Sections 3.2-3.3

- A **linear programming problem** consists of the following:
(First, don't forget to DEFINE YOUR VARIABLES.)
 1. **objective function**—what you are trying to maximize or minimize.
 2. **constraints**—usually in the form of inequalities. These are recognized by key words such as “at least,” “at most,” “no more than,” etc.
- If the feasible region is bounded, there is both a maximum and a minimum.
- If the feasible region is unbounded, there will usually be a minimum but no maximum. (Note the word *usually*. This may not always be true. In the unbounded case, you need to consider the objective function.)
- To solve a linear programming problem, use the **method of corners**.
 1. Graph the feasible region (or set).
 2. Find all corner points (vertices).
 3. Evaluate the objective function at every corner point.
 4. Two cases (assuming there is a maximum/minimum):
 - If the objective function is maximized/minimized at exactly one corner point, then this point is a unique solution.
 - If the objective function is maximized/minimized at two adjacent corner points, there are infinitely many solutions. These solutions all lie on the line segment joining the two corner points.
- Leftover resources are the differences between how much you actually use and how much was available.