Things that you should know for Midterm 1

- Definition of a linear function or constraint
- Overview of the simplex algorithm geometrically
- Overview of the simplex algorithm algebraically
- Overview of the simplex algorithm in tabular form
- Being able to graph a feasible region for a two dimensional problem
- Being able to solve a two dimensional problem graphically
- Being able to actually run through the steps of the simplex algorithm either algebraically or in tabular form
- Writing a linear optimization problem in standard form. NOTE: let us standardize our notation here. Let's say that standard form means a linear optimization problem where all of the slack and artificial variables have been introduced, and all of the right hand sides are non-negative. So all constraints should be either hyperplanes (defined by an equality) or non-negativity constraints.
- Changing a problem with $=$ or $\geq$ constraints to $\leq$ constraints by using the Big M method
- What to do when the original constraints have a decision variable either greater than or equal to a negative number or not bounded below at all
- Understanding that using the Big M or Two Phase method is enlarging the feasible region but that any optimal solution will be in the actual feasible region
- Understanding what happens during the Big M or Two Phase method when there is no feasible solution
- Understanding what happens when the objective function is unbounded
- The definition of a convex set and a convex combination of points
- The definition of a corner in terms of strict convex combinations
- The definition of a basic feasible solution in terms of linearly independent vectors
- The equivalence of corners and basic feasible solutions
- The simplex method in matrix form
- The fundamental insight and calculating a final simplex tableau given the initial problem and the columns of the final table corresponding to the basic variables