**Summary of Simplex Algorithm (MAX)**

1. *Convert to a form with all positive right-hand sides, non-negativity constratints and a max objective:*
   (a) If the objective is min, negate the objective
   (b) If a variable $x_i$ is unrestricted, replace it with $x_i^{'} - x_i^{''}$
   (c) If the right hand side of a constraint is negative, multiply the constraint by $-1$.
2. *Add variables to convert to equality constraints*
   (a) In each $\leq$ constraint, add a slack variable.
   (b) In each $\geq$ constraint, add an excess and an artifical variable.
   (c) In each $=$ constraint, add an artifical variable.
   (d) For each artificial variable $a_i$, add $-Ma_i$ to the objective, where $M$ is a large number.
3. *Set up initial tableaux*
   (a) Place, on the left hand side of each equation, either a slack or artificial variable.
   (b) Use the equations for the artificial variables to remove the artificial variables in the objective function.
4. *We now have a tableaux and a basic feasible solution in which all the right-hand-side variables are zero.*
5. Repeatedly pivot, choosing a variable with positive objective function coefficient as the entering variable and the most limiting (ratio test) variable as the leaving variable.
6. *Stopping conditions*
   (a) If at some point, no constraint limits the increase in the entering variable, return **unbounded**
   (b) Stop when no non-basic variable has positive coefficient in the objective function.
7. *Obtaining a solution*
   (a) If an artificial variable is non-zero, return **infeasible**.
   (b) Else, return the basic feasible solution and optimal objective function value.