**Linear Programming Maximization Notes**

To determine optimal production rate to maximize profit, follow these steps:

1. Define the decision variables for the problem.
2. Use the decision variables to define the objective function.
3. Use the decision variables to define all constraints.
4. Graph the feasible region.
5. Identify the corner points of the feasible region.
6. Calculate the profit at each corner point.
7. Determine which corner point yields the highest profit.
8. Interpret the optimal solution in the context of the problem.

**Example**

*An Introductory Problem – the furniture company*

A certain furniture company makes two products: tables and chairs. To make a table requires two large and two small pieces, and a chair requires one large and two small pieces. Suppose the company can only obtain six large and eight small pieces per day. The profit from each table is $16 and the profit from each chair is $10. What is the optimal daily production rate of tables and chairs to maximize profit?

1. Define the **decision variables** for the problem.

*Decision variables are what you need to determine to answer the question.*

$$x\_{1}:$$

$$x\_{2}:$$

1. Use the decision variables to define the **objective function**.

*In these problems, our objective will always be to maximize profit. So our objective function will be a profit function. It is standard to let the variable* z *represent profit.*

$$z=$$

1. Use the decision variables to define all **constraints**.

*Constraints are conditions placed upon the business that limit the possible solutions. They are conditions like time, limited supplies, non-negativity, etc.*

1. Graph the feasible region.

*The feasible region is the area on the graph that represents all possible production rates of the decision variables, given the constraints. Always let* $x\_{1}$ *lie on the horizontal axis and* $x\_{2}$ *lie on the vertical axis for consistency. You will need to solve the constraint inequalities for* $x\_{2}$*.*



1. Identify the corner points of the feasible region.
2. Calculate the profit at each corner point.
3. Determine which corner point yields the highest profit.
4. Interpret the optimal solution in the context of the problem.