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# Maximizing the Profit of a Business

Math 1010 Intermediate Algebra Group Project

## Background Information:

Linear Programming is a technique used for optimization of a real-world situation. Examples of optimization include maximizing the number of items that can be manufactured or minimizing the cost of production. The equation that represents the quantity to be optimized is called the objective function, since the objective of the process is to optimize the value. In this project the objective is to maximize the profit for a company that manufactures furniture.

The objective is subject to limitations or constraints that are represented by inequalities. Limitations on the number of items that can be produced, the number of hours that workers are available, and the amount of money a company has for advertising are examples of constraints that can be represented using inequalities. Making and selling an infinite amount of furniture is not a realistic goal. In this project the constraints will be based on the number of weekly work hours available in two departments that construct the furniture.

Graphing the system of inequalities based on the constraints provides a visual representation of the amount of furniture that it is feasible to make in a week. If the graph is a closed region, it can be shown that the values that optimize the objective function will occur at one of the "corners" of the region.

## The Problem:

In this project your group will solve the following situation:

A manufacturer produces the following two items: computer desks and bookcases. Each item requires processing in each of two departments. In the cutting department the pieces of wood required for each item are cut out. The assembly department is where the pieces are assembled into desks and bookcases. The cutting department has 48 hours available and the assembly department has 36 hours available each week for production. To manufacture a computer desk requires 4 hours of cutting and 4 hours of assembly while a bookcase requires 3 hours of cutting and 2 hours of assembly. Profits on the items are \$56 and \$38 respectively. If all the units can be sold, how many of each should be made to maximize profits?