

Assignment: Module 2 - The LP Model

1. a. The decision variables are number of units of bags – the collegiate(x_1) and the mini(x_2) produced per week.
b. Objective function is to maximize the profit by the sale of the two types of bag.
$$Z = 32x_1 + 24x_2$$

c. Constraints are the maximum bags can be sold per week thus the manufacturing count should be less than that.
$$x_1 \leq 1000, x_2 \leq 1200$$

Another constraint is the number of hours labors can work per week.
$$45x_1 + 40x_2 \leq 40 \cdot 60 \cdot 35$$

d. Mathematical formula for the linear problem.
$$Z = 32x_1 + 24x_2$$

$$x_1 \leq 1000, x_2 \leq 1200$$

$$45x_1 + 40x_2 \leq 40 \cdot 60 \cdot 35$$

2. a. Decision variables:
Let's assume that below are the **per day** production rate/volume

X_{11} = number of Large Products made at Plant 1
 X_{12} = number of Medium Products made at Plant 1
 X_{13} = number of Small Products made at Plant 1

X_{21} = number of Large Products made at Plant 2
 X_{22} = number of Medium Products made at Plant 2
 X_{23} = number of Small Products made at Plant 2

X_{31} = number of Large Products made at Plant 3
 X_{32} = number of Medium Products made at Plant 3
 X_{33} = number of Small Products made at Plant 3

b. LP model:

Constraints:

$$X_{11} + X_{12} + X_{13} \leq 750$$

$$X_{21} + X_{22} + X_{23} \leq 900$$

$$X_{31} + X_{32} + X_{33} \leq 450$$

$$20 \cdot X_{11} + 15 \cdot X_{12} + X_{13} \leq 13000$$

$$20 \cdot X_{21} + 15 \cdot X_{22} + X_{23} \leq 12000$$

$$20 \cdot X_{31} + 15 \cdot X_{32} + X_{33} \leq 5000$$

$$X_{11}+X_{21}+X_{31}\leq 900$$

$$X_{12}+X_{22}+X_{32}\leq 1200$$

$$X_{13}+X_{23}+X_{33}\leq 750$$

Objective Function:

Maximize the profit $C=(X_{11}+X_{21}+X_{31}) * 420+(X_{12}+X_{22}+X_{32}) * 360+(X_{13}+X_{23}+X_{33}) * 300$