

## **Assignment 1**

### **1) Decision Variables:**

Here, there are 2 decision variables which are, number of collegiates to produce in a week and number of minis produced in a week.

$X_1$  = Number of collegiate to produce / week

$X_2$  = Number of mini to produce / week

### **2) Defining the objective function:**

The aim of the task is to determine the number of units that should be created for each rucksack in order to maximize profit.

Collegiate ( $X_1$ ) = 32 \$ profit

Mini ( $X_2$ ) = 24 \$ profit.

The Maximum combined profit for both backpack ( $P$ ) =  $32(X_1) + 24(X_2)$

### **3) Constraints:**

Nylon and Labor Hours:

According to the problem statement mentioned 3 sq ft of nylon is required for Collegiate =  $3(X_1)$

According to the problem statement mentioned 2 sq ft of nylon is required for mini =  $2(X_2)$

$$3(X_1) + 2(X_2) \leq 5000$$

According to the problem statement time required to make 1  $X_1$  = 45 min

According to the problem statement time required to make 1  $X_2$  = 40 min

35 labor working 40 hours per week = 1400 hrs

$$45(X_1) + 40(X_2) \leq 1400 * 60$$

### **4) The Mathematical formulation for this LP problem:**

The Maximum combined profit for both backpack ( $P$ ) =  $32(X_1) + 24(X_2)$

The Raw material required:  $3(X_1) + 2(X_2) \leq 5000$

The Labor hour required:  $45(X_1) + 40(X_2) \leq 84000$  Minutes