Assignment-1

Github Link - https://github.com/vdarapan/Quant-Management-Modeling

2. Back Savers is a company that produces backpacks primarily for students. They are considering offering some combination of two different models—the Collegiate and the Mini. Both are made out of the same rip-resistant nylon fabric. Back Savers has a long-term contract with a supplier of the nylon and receives a 5000 square-foot shipment of the material each week. Each Collegiate requires 3 square feet while each Mini requires 2 square feet. The sales forecasts indicate that at most 1000 Collegiates and 1200 Minis can be sold per week. Each Collegiate requires 45 minutes of labor to produce and generates a unit profit of $32. Each Mini requires 40 minutes of labor and generates a unit profit of $24. Back Savers has 35 laborers that each provides 40 hours of labor per week. Management wishes to know what quantity of each type of backpack to produce per week.

   a. Clearly define the decision variables
   b.What is the objective function?
   c. What are the constraints?
   d. Write down the full mathematical formulation for this LP problem.

a) The decision variables are the unknown variable which needs to be determined. Here in this question,

   We need to find what quantity of each type of backpack to produce in a week.

   We are defining variables as:

   X= A number of Collegiate to be produced in each week

   Y= A number of Mini to be produced in each week

b) We need to maximize the profits by selling the Backpacks. The number of backpack sold each week should be increased.

   We define the objective functions as

   Z=32X+24Y

c) There are two constraints mentions in the question that is Material availability of nylon and time taken by the labor to manufacture the backpacks

1) Material availability:

   3X+2Y<=5000

2) Time taken by Labor for production of Backpacks are:-

   45X+40Y<=84000

d) The full mathematical formulation for this LP problem is:

Maximize Z=32X +24Y

3X+2Y<=5000

45X+40Y<=84000

AND X>=0,Y>=0