LINEAR PROGRAMINNG

ASSIGNMENT 1

1) The decision variables identified in the problem is, **How much quantity of each type of Backpack's** is to be produced in every week with respect to maximizing the profits of Back Savers.

For finding out quantity of each type of backpack we are defining the variables as below: -

X = Units of number Collegiate to be produced in each week
Y = Units of number Mini to be produced in each week

2) The main objective for the Back Savers company is to maximize the profits by selling the Back packs. Since it is given that by selling a unit of collegiate, they are earning a profit of $32 per week and by selling a mini they are earning a profit off $ 24.

We can define our objective function as below:

MAXMIZE Z = 32 X + 24 Y

3) In the given problem there are two different types of constraints i.e. Material availability of nylon and time taken by the labor to manufacture Back packs

a. Material Availability of nylon sheet: -
   Collegiate requires 3mt of nylon sheet and mini requires 2mt and there is limited availability of nylon sheet i,e 5000 meters. We can define the constraint as:-
   $3X + 2Y \leq 5000$
b. Time taken by Labor to for production of Back Packs: -
   Since it is mentioned that they are 35 labor and they are available for 40 hours a week. We can get the total time availability as 35*40 = 1400 hours/week. Also, collegiate requires 45 mins and mins require 40 mins for one-unit production. We can define the constraint as: -
   $45X + 40Y \leq$ **84000**

4) Proceeding as for the Back Savers, we can now formulate the mathematical model for this general problem of allocating resources to activities. In particular, this model is to select the values for X and Y so as to

Maximize Z = **32 X + 24 Y**

Subject to the restrictions

$3X + 2Y \leq 5000$ (NYLON SHEET)
$X \leq 1000$ (ATMOST SALES)
$Y \leq 1200$ (ATMOST SALES)
$45X + 40Y \leq 84000$ (TIME PERIOD)

And

$X \geq 0, Y \geq 0$