QUANTITATIVE MANAGEMENT MODELING
ASSIGNMENT – 1

1. Decision Variable:
   There are two decision variables:
   C_1 – Number of Collegiate to produce
   C_2 – Number of mini to produce

   Objective Function:
   Collegiate C_1 = 32$ profit
   Mini C_2 = 24$ profit
   The Maximum combined profit $P = 32(C_1) + 24(C_2)$

   Constraints:
   According to the given statement in the problem,
       3sqft of nylon is required for collegiate = $3(C_1)$
       2sqft of nylon is required for mini = $2(C_2)$
       $3(C_1) + 2(C_2) <= 5000$
   According to the given statement in the problem,
       Time required to make 1 C_1 = 45 mins
       Time required to make 1 C_2 = 40 mins
       $45(C_1) + 40(C_2) <= 1400$

   The Mathematical Formula for this LP is:

       $P = 32(C_1) + 24(C_2)$

   Raw Material Required: $3(C_1) + 2(C_2) <= 5000$
   Labor Hour Required: $45(C_1) + 40(C_2) <= 1400$

2. Decision Variables:
   There are 9 decision variables:
   The storage space for each size for X1, Y1, Z1.
   The production per day X2, Y2, Z2.
   The Forecast of sales X3, Y3, Z3.

   LP Formulation:
   Max (P) = 420(X1+X2+X3) + 360(Y1+Y2+Y3) + 300(Z1+Z2+Z3)

   Constraints:
   X1+Y1+Z1 <= 750
   X2+Y2+Z2 <= 900
   X3+Y3+Z3 <= 450

   Production:
   20X1+15Y1+12Z1 < = 13000
   20X2+15Y2+12Z2 <= 12000
   20X3+15Y3+12Z3 <= 5000

   Storage:
   X1+X2+X3 <= 900
   Y1+Y2+Y3 <=1200
   Z1+Z2+Z3 <= 7500

   1/750(X1+Y1+Z1) – 1/900(X2+Y2+Z2) = 0
   1/750(X1+Y1+Z1) – 1/450(X3+Y3+Z3) = 0

   Therefore: X1, X2, X3, Y1, Y2, Y3, Z1, Z2, Z3 >= 0