1)

Decision Variables:

Let CB be the Number of Collegiate Bags

Let MB be the Number of Mini Bags

Let PR be the Total Profit/Objective Function

Objective Function:

The Maximize Profit be the PR (CB, MB) =32CB+24MB

Non-Negativity:

$0 \leq CB \leq 1000$(Since we cannot have any negative Backpack)

$0 \leq MB \leq 1200$(Since we cannot have any negative Backpack)

Constraints:

There are 2 Constraints that are present in the problem.

1)Nylon Constraint

CB<- requires 3 sqft Nylon

MB<- requires 2 sqft Nylon

$3CB+2MB \leq 5000$

2)Labour Constraint

35*40=1400 Hours (Number of available Hours * Number of hours each Labour works)

Mathematical Formulation:

Maximizing Profit PR (CB, MB) is equal to 32CB+24MB

Let CB=Number of Collegiate Bags

Let MB= Number of Mini Bags

Let PR=Total Profit/Objective Function

Total Nylon given=5000 Sqft

Total Labour hours that are required=35*40=1400 hrs

Assume that

CB<- requires 3 sqft Nylon used by Collegiate

MB<- requires 2 sqft Nylon used by mini

$3CB+2MB \leq 5000$

Which calculating labour costs of Collegiate:

Each labour unit takes around 45 minutes: 45/60= 3/4

Which calculating labour costs of Mini:

Each labour unit takes around 40 minutes: 40/60= 2/3

$(3/4)\ CB+(2/3)\ MB \leq 1400$

2)

Decision Variables:

Let PLANT $SIZES_{ij}$ be the number of units of plant sizes.

PLANT SIZES is the number of plant units

I be the number of plants (1,2,3)

J be number that holds the plant of sizes (Small(S), Medium(M), Large(L)).

M=Maximized value

Formulating the linear programming model:

Objective Function:

$M=420(PLANT\ SIZES_{1L}+PLANT\ SIZES_{2L}+PLANT\ SIZES_{3L})+360(PLANT\ SIZES_{1M}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{3M})+300(PLANT\ SIZES_{1S}+PLANT\ SIZES_{2S}+PLANT\ SIZES_{3S})$

Constraints:

There are 3 Constraints that we can identify in this problem.

Sizes:

$(PLANT\ SIZES_{1L}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{3S})$

≤ 750 (plant 1)

$(PLANT\ SIZES_{2L}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{3S}) \leq 900$ (plant 2)

$(PLANT\ SIZES_{1L}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{3S}) \leq 450$ (plant 3)

Storage Units:

$20\ PLANT\ SIZES_{1L}+15PLANT\ SIZES_{1M}+12PLANT\ SIZES_{1S} \leq 13000$

$20\ PLANT\ SIZES_{2L}+15PLANT\ SIZES_{2M}+12PLANT\ SIZES_{2S} \leq 12000$

$20\ PLANT\ SIZES_{3L}+15PLANT\ SIZES_{3M}+12PLANT\ SIZES_{3S} \leq 5000$

Sales Forecast:

$PLANT\ SIZES_{1L}+PLANT\ SIZES_{1M}+PLANT\ SIZES_{1S} \leq 900$

$PLANT\ SIZES_{2L}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{2S} \leq 1200$

$PLANT\ SIZES_{3L}+PLANT\ SIZES_{3M}+PLANT\ SIZES_{3S} \leq 750$

Percentage that is required to avoid the Layoff:

$((PLANT\ SIZES_{1L}+PLANT\ SIZES_{1M}+PLANT\ SIZES_{1S})/750) *100$

$((PLANT\ SIZES_{2L}+PLANT\ SIZES_{2M}+PLANT\ SIZES_{2S})/900) *100$

$((PLANT\ SIZES_{3L}+PLANT\ SIZES_{3M}+PLANT\ SIZES_{3S})/450) *100$