ASSIGNMENT_1: LINEAR PROBLEM

1.Question:

a) Decision Variables:

C = Quantity of Collegiate backpacks produced

M = Quantity of Mini backpacks produced

b) Objective Function:

Max B= 32C+24M, amount in $

c) Constraints:

Demand:

$C \leq 1000$
$M \leq 1200$

Nylon Resource:

$3C+2M \leq 5000$

Labor:

$0.75C + 0.66M \leq 1400$

Non-negativity:

$C \geq 0, M \geq 0$

d) The objective function of the problem is to maximize the profit, it is expressed as linear equation $B=34C+24M$. Here, B is profit, C and B is decision variables.

The constraints are demand, which is the sales forecasts indicate that at most 1000 Collegiates and 1200 Minis can be sold per week, it is expressed as $C \leq 1000$, $M \leq 1200$. Nylon resource, which is Back Savers receives 5000 square-foot shipment of the material each week and each Collegiate requires 3 square feet while each Mini requires 2 square feet. So, $3C+2M \leq 5000$. Labor, which is Back Savers, has 35 laborers that each provides 40 hours of labor per week so $35*40=1400$, $0.75C + 0.66M \leq 1400$. The non-negativity constraint is $C \geq 0$, $M \geq 0$

2) Question:

a) Decision Variables:

PL1= Quantity of Large units produced in plant 1 per day

PL2= Quantity of Large units produced in plant 2 per day

PL3= Quantity of Large units produced in plant 3 per day

PM1= Quantity of Medium units produced in plant 1 per day

PM2= Quantity of Medium units produced in plant 2 per day

PM3= Quantity of Medium units produced in plant 3 per day

PS1= Quantity of Small units produced in plant 1 per day

PS2= Quantity of Small units produced in plant 2 per day

PS3= Quantity of Small units produced in plant 3 per day

b) Formulating Linear Programming model:

Objective Function:

Max P = 420(PL1+PL2+PL3) + 360(PM1+PM2+PM3) + 300(PS1+PS2+PS3)

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Constraints:

Production:

PL1+PM1+PS1 ≤ 750

PL2+PM2+PS2 ≤ 900

PL3+PM3+PS3 ≤ 450

Storage:

20PL1+15PM1+12PS1 ≤ 13,000

20PL2+15PM2+12PS2 ≤ 12,000

20PL3+15PM3+12PS3 ≤ 5,000

Demand:

PL1+PL2+PL3 ≤ 900

PM1+PM2+PM3 ≤ 1200

PS1+PS2+PS3 ≤ 750

Labor:

((PL1+PM1+PS1)/750) - ((PL2+PM2+PS2)/900) = 0

((PL1+PM1+PS1)/750) − ((PL3+PM3+PS3)/450) = 0

Non-negative Constraints:

PL1 ≥ 0,   PL2 ≥ 0,   PL3 ≥ 0,

PM1 ≥ 0,   PM2 ≥ 0,   PM3 ≥ 0,

PS1 ≥ 0,   PS2 ≥ 0,   PS3 ≥ 0