Quantitative Management Modeling

Assignment - 1

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1. Given in the problem,

	S2	Time(min)	profit/unit
Collegiate	3	45	32$
Mini	2	40	24$

35 labours → 40 hrs for each

a. Decision variables

Collegiate = x_c

Mini = x_m

b. Objective function

Maximize [profit] $Z = 32x_c + 24x_m$

c. constraints

Labour constraints : $45x_c + 40x_m \leq (35)(40)(60)$

Material Constraints: $3x_c + 2x_m \leq 5000$

Non Negativity: $x_c, x_m \geq 0$

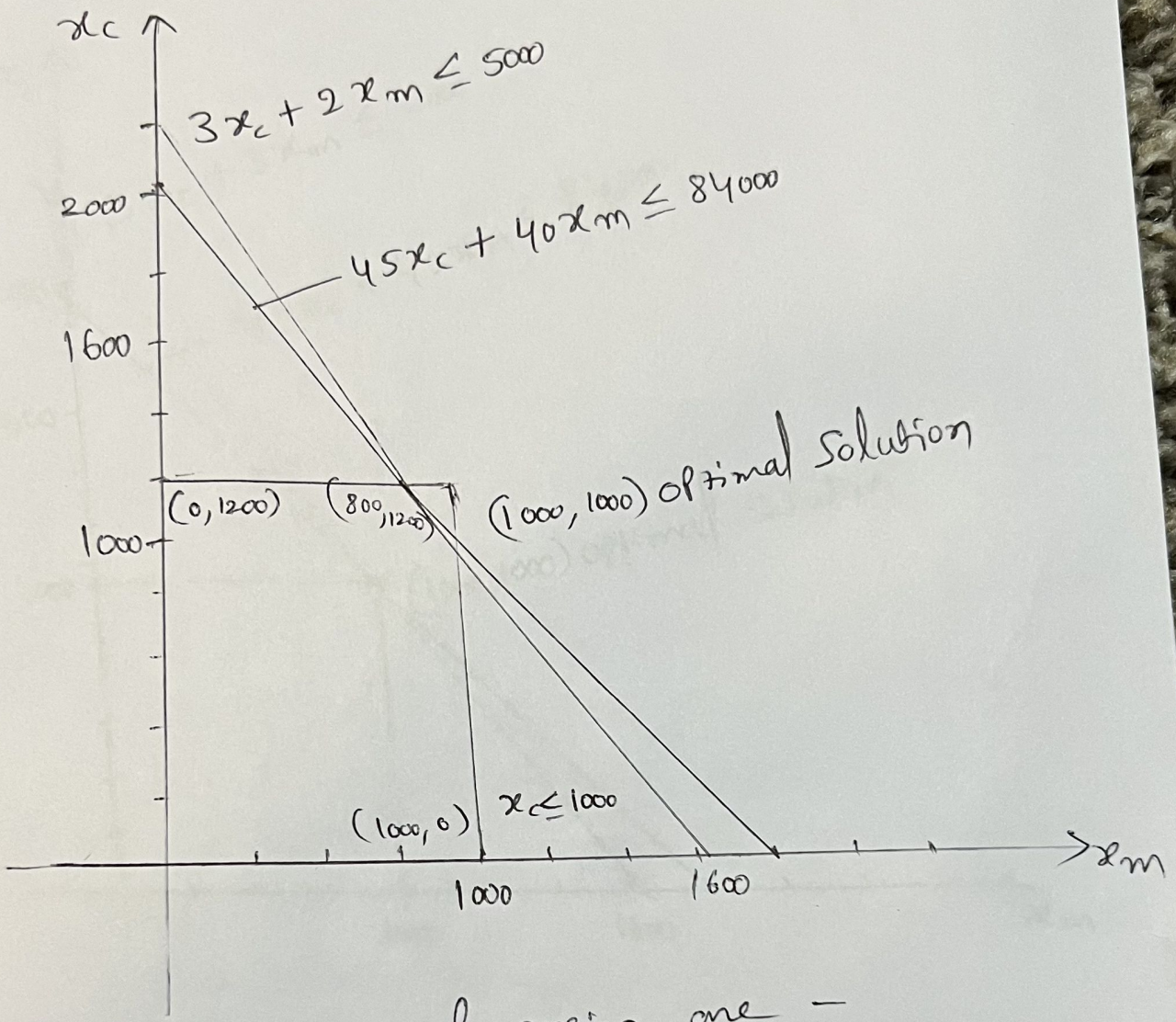
$x_c \leq 1000$

$x_m \leq 1200$

d. $Z = 32x_c + 24x_m$ (maximize)

$45x_c + 40x_m \leq (35)(40)(60)$

$3x_c + 2x_m \leq 5000$



Corner Points of region one –

(0,0) (1000,0) (0, 1200) (800, 1200) (1000, 1000)

Merge the Valy in objective function –

$$Z = 32x_c + 24x_m$$

(0,0) Then Z = 0

(1000, 0) Then Z = 32,000

(0, 1200) Then Z = 28,800

(800, 1200) Then Z = 54,400

(1000, 1000) Then Z = 56,000

The optional Solution for this problem is

⇒ 1000 collegiate backpacks per week, 975 minibackpacks /we

2.

a. Decision variables

L = No. of Large shirts

M = Number of medium shirts

S = Number of small shirts

b. LP models:

objective function

Maximize $Z = 420L + 360M + 300S$

$\because L = L_1 + L_2 + L_3$

$M = M_1 + M_2 + M_3$

$S = S_1 + S_2 + S_3$

constraints:

capacity constraint

$L_1 + M_1 + S_1 \leq 750$

$L_2 + M_2 + S_2 \leq 900$

$L_3 + M_3 + S_3 \leq 450$

storage constraint

$20L_1 + 15M_1 + 12S_1 \leq 13000$

$20L_2 + 15M_2 + 12S_2 \leq 12000$

$20L_3 + 15M_3 + 12M_3 \leq 5000$

same capacity percentage constraint

$900(L_1 + M_1 + S_1) - 750(L_2 + M_2 + S_2) = 0$

$450(L_2 + M_2 + S_2) - 900(L_3 + M_3 + S_3) = 0$

Non Negativity

$L_1, L_2, L_3 \geq 0$

$M_1, M_2, M_3 \geq 0$

$S_1, S_2, S_3 \geq 0$