Assignment 2

Q1) Computer Staffing Centre

1) **Assuming that there are full time workers in 3 shifts s1, s2, s3**

Number of full-time employees in 8am – 4 pm = s1

Number of full-time employees in 12pm -8pm =s2

Number of full-time employees in 4pm-12 am = s3

2) **Assuming the part time employees for the shifts are x1,x2,x3,x4**

Number of full-time employees in 8am-12 pm = x1
Number of full-time employees in 12pm-4pm = x2
Number of full-time employees in 4pm -8 = x3
Number of full-time employees in 8-12 am =x4

3) **Constraints:**

8-12 am >=4, i.e. s1+x1 >=4
12pm-4pm >=8, i.e. s1+s2+x2 >=8
4pm -8 >= 10, i.e. s2+s3+x3 >=8
8-12 am > =6, i.e. s3+x4 >=6

One full time should be there with part time during a shift

s1,s2,s3,x1,x2,x3,x4 >= 0

Min : 112 S1 + 112 S2 +112 S3 + 48 X1 + 48 X2 + 48 X3 + 48 X4

st:

s1+x1 >=4
s1+s2+x2 >=8
s2+s3+x3 >=8

s3+x4 >=6
s1>=x1 for 1st shift
s1+s2 >=x2 for 2nd shift
s2+s3>= x3 for 3rd shift
s3>= x4 for 4th shift

Minimum number of employees required are = **28**

Time required to complete the work is 4, total number of fulltime = **28/4=7** and remaining **14** are parttime

Given Fulltime employees are paid 14 $/hr and for 8 hrs = **14 * 8 = 112,**
Therefore 7 FT salary per head is = **112*7 = 784**

Part time employees are paid 12 /h and for 4 hrs from the table = **12 * 4 = 48**
For 14 parttime employees = **48 * 14 = 672**

Therefore, minimum daily cost is = **784 + 672 = 1456**

B) If 1 hr break is provided

If one hour break is provided, then full time employees will work for only 7 hrs

And the cost will be = **14*8 = 98**, and for 7 employees = **98 * 7 = 686**

Since part time employees does not have a break, their cost will remain at = **672**

Total minimum daily cost after providing 1 hrs break is **= 686 + 672 = 1358**

Minimum cost = **98 $.**

Question 2)

C = number of collegiate bags

M =number of minis

Maximize

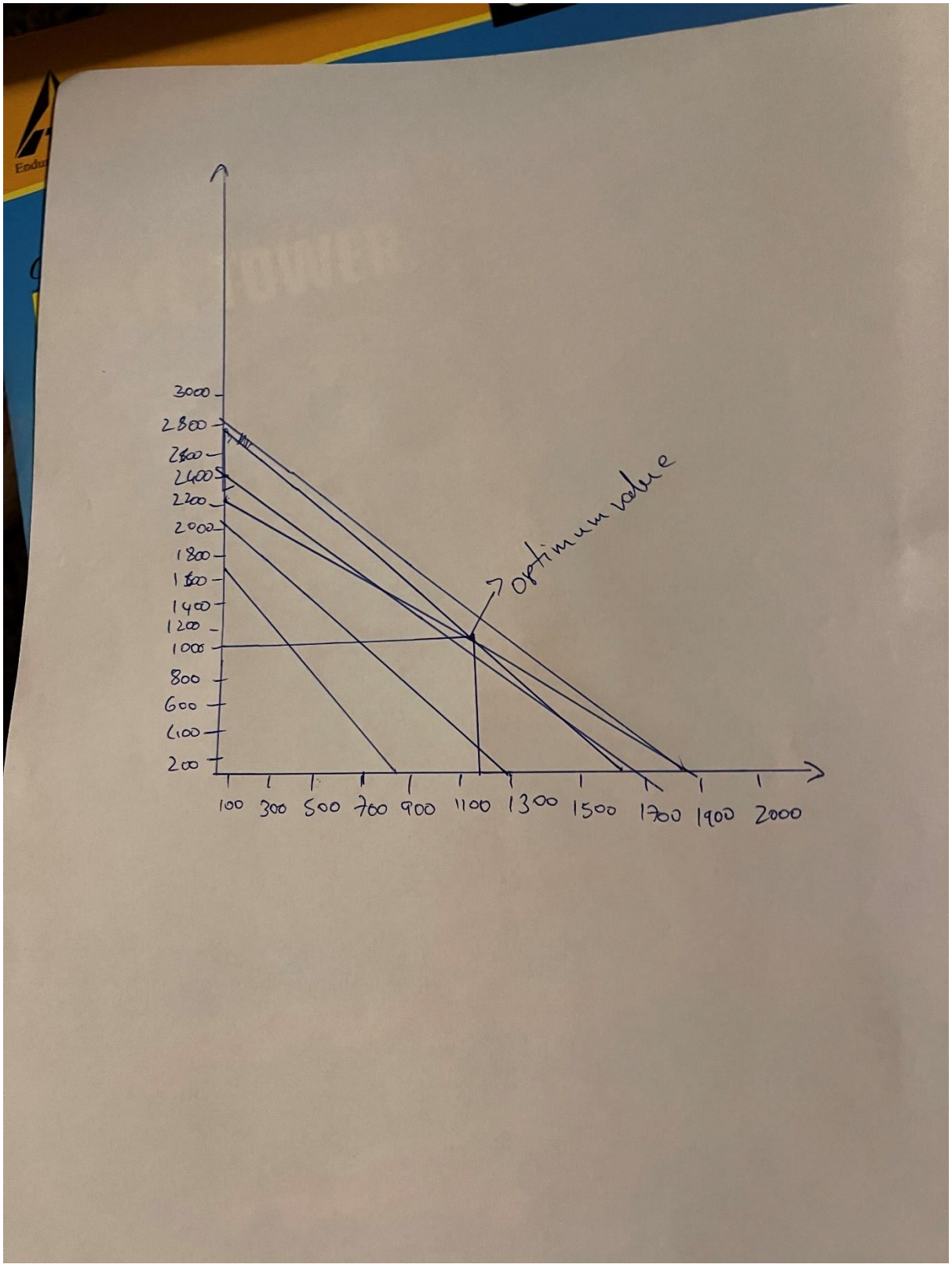
Z = 32C +24M

St

3C + 2M <= 5000, C <=1000, `M<=1200

45C + 40M <= 35*60*40 , 45C + 40M<=84000

C,M>=0



Graphical representation

Question 3)

X =large, Y= Medium, Z = small

A) **Decision Variables**

Storage space for each size for X1 , Y1, Z1.
Production per day X2,Y2,Z2
Forecast of sales X3,Y3, Z3
Total 9 decision variables

B) **LP formulation.**

Max P = 420(X1+X2+X3) + 360 (Y1+Y2+Y3)+ 300(Z1+Z2+Z3)
St
X1+Y1+Z1 <=750
X2+Y2+Z2 <=900
X3+Y3+Z3 <=450

Productions :
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

C) **R pdf file in git hub**