Quantitative Management Modelling

Name & Id: Pallepati Pallavi (#811249048)

Assignment 4 – LP Model (R Program)

Question 2:

Let X = Large, Y = Medium and Z= small

2A. Decision Variables:

Let X1, Y1, Z1 be the quantities produced in L, M & S for plant 1
Let X2, Y2, Z2 be the quantities produced in L, M & S for plant 2 Let
X3, Y3, Z3 be the quantities produced in L, M & S for plant 3

2B. Formulating LP model:

Let the objective function be Z which represents the maximum profit =

Z= 420 (X1+X2+X3) + 360(Y1 +Y2+Y3) + 300 (Z1+Z2+Z3)

Capacity Constraints:

X1+Y1+Z1<=750 (Excess production of 750 units of plant 1 every day)

X2+Y2+Z2<=900 (excess production of 900 units of plant 2 every day)

X3+Y3 +Z3<=450 (excess production of 450 units of plant 3every day) Storage

constraint:

20X1+15Y1+12Z1<=13000 (storage capacity of plant 1 13000 sq.ft)

20X2+ 15Y2+ 12Z2<= 12000 (storage capacity of plant 2 12000 sq.ft)

20X3+15Y3+12Z3<= 5000 (storage capacity of plant 3 5000 units sq.ft) Sales

constraints:

L = X1+X21+X3 <=900 (900 Units needs to be sold plant 1 every day)

M= Y1+Y2+Y3<= 1200 (1200 Units needs to be sold plant 2 every day)

S= Z1+Z2+Z3<= 750 (750 Units needs to be sold plant 3 every day)

Xx,Yx,Zx>=0

Percentage Constraints:

As said that plant always consumes same % of their excess capacity to produce the new product, below are the equations:

(X1+Y1+Z1)/750=(X2+Y2+Z2)/900=(X3+Y3+Z3)/S450

It can be written as:

900(X1+Y1+Z1) =750 (X2+Y2+Z2)

450 (X2+Y2+Z2) = 900 (X3+Y3+Z3)

450 (X1+Y1+Z1) =750(X3+Y3+Z3) Non-

Negative zero:

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