ASSIGNMENT 3

Lets us Assume that,

The production of large size products in the plants 1, 2, 3 are D1, D2, D3.

The production of medium size products in the plants 1, 2, 3 are E1, E2 ,E3.

The production of small size products in the plants 1, 2, 3 are F1, F2, F3.

The objective function of the problem is to maximise Z

Z = 420(D1 + D2 + D3) + 360(E1 + E2 + E3) + 300(F1 + F2 + F3)

Reconstructing the objective function,

Max Z = 420D1 + 360E1 + 300F1 + 420D2 + 360E2 + 300F2 + 420D3 + 360E3 + 300F3

Considering the constraints from the given problem,

D1 + E1 + F1 ≤ 750, D2 + E2 + F2 ≤ 900, D3 + E3 + F3 ≤ 450

20D1 + 15E1 + 12F1 ≤ 13000, 20D2 + 15E2 + 12F2 ≤ 12000, 20D3 + 15E3 + 12F3 ≤ 5000

D1 + D2 + D3 ≤ 900, E1 + F2 + F3 ≤ 1200, E1 + E2 + E3 ≤ 750

Non-negativity constraints :

D1, D2, D3, E1, E2, E3, F1, F2, F3 ≥ 0

The above LP issue constraints can be written in this format also:

D1 + E1 + F1 + 0D2 + 0E2 + 0F2 + 0D3 + 0E3 + 0F3 ≤ 750

0D1 + 0E1 + 0F1 + D2 + E2 + F2 + 0D3 + 0E3 + 0F3 ≤ 900

0D1 + 0E1 + 0F1 + 0D2 + 0E2 + 0F2 + D3 + E3 + F3 ≤ 450

20D1 + 15E1 + 12F1 + 0D2 + 0E2 + 0F2 + 0D3 + 0E3 + 0F3 ≤ 13000

0D1 + 0E1 + 0F1 + 20D2 + 15E2 + 12F2 + 0D3 + 0E3 + 0F3 ≤ 12000

0D1 + 0E1 + 0F1 + 0D2 + 0E2 + 0F2 + 20D3 + 15E3 + 12F3 ≤ 5000

D1 + 0E1 + 0F1 + D2 + 0E2 + 0F2 + D3 + 0E3 + 0F3 ≤ 900

0D1 + E1 + 0F1 + 0D2 + E2 + 0F2 + 0D3 + E3 + 0F3 ≤ 1200

0D1 + 0E1 + F1 + 0D2 + 0E2 + F2 + 0D3 + 0E3 + F3 ≤ 750

#Solution to the problem

#installing the required packages

#install.packages("lpsolve")

#library

library(lpSolve)

#The objective function of the problem is to maximize Z = 420D1 + 360E1 + 300F1 + 420D2 + 360E2 + 300F2 + 420D3 + 360E3 + 300F3

Obj\_fun<-c(420,360,300,420,360,300,420,360,300)

#constraints of the problem are written below in the matrix form:

con\_fun <-matrix(c(1,1,1,0,0,0,0,0,0,

0,0,0,1,1,1,0,0,0,

0,0,0,0,0,0,1,1,1,

20,15,12,0,0,0,0,0,0,

0,0,0,20,15,12,0,0,0,

0,0,0,0,0,0,20,15,12,

1,0,0,1,0,0,1,0,0,

0,1,0,0,1,0,0,1,0,

0,0,1,0,0,1,0,0,1),

nrow = 9, byrow = TRUE)

#To set the direction of the inequalities using subject to equation for this.

Dir\_fun <-c("<=",

"<=",

"<=",

"<=",

"<=",

"<=",

"<=",

"<=",

"<=")

#To set the right hand side of the coefficients

rhs\_fun <-c(750,900,450,13000,12000,5000,900,1200,750)

#To find the objective function value

lp("max", Obj\_fun, con\_fun, Dir\_fun, rhs\_fun)

#Values of each variable

lp("max", Obj\_fun, con\_fun, Dir\_fun, rhs\_fun)$solution