Assignment 2

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library(lpSolve)  
  
# The main goal is to increase  
# The goal function is next.  
# Max Z = 420L1 + 360M1 + 300S1 + 420L2 + 360M2 + 300S2 = 420L3 + 360M3 + 300S3  
  
f.obj<-c(420,360,300,420,360,300,420,360,300)  
  
# Subject to  
# L1 + M1 + S1 ≤ 750  
# L2 + M2 + S2 ≤ 900  
# L3 + M3 + S3 ≤ 450  
#   
# 20L1 + 15M1 + 12S1 ≤ 13000  
# 20L2 + 15M2 + 12S2 ≤ 12000  
# 20L3 + 15M3 + 12S3 ≤ 5000  
#   
# L1 + L2 + L3 ≤ 900  
# M1 + M2 + M3 ≤ 1200  
# S1 + S2 + S3 ≤ 750  
#   
# Using all 9 variables in each equation, write down the following constraints:  
# L1 + M1 + S1 + 0L2 + 0M2 + 0S2 + 0L3 + 0M3 + 0S3 ≤ 750  
# 0L1 + 0M1 + 0S1 + L2 + M2 + S2 + 0L3 + 0M3 + 0S3 ≤ 900  
# 0L1 + 0M1 + 0S1 + 0L2 + 0M2 + 0S2 + L3 + M3 + S3 ≤ 450  
# 20L1 + 15M1 + 12S1 + 0L2 + 0M2 + 0S2 + 0L3 + 0M3 + 0S3 ≤ 13000  
# 0L1 + 0M1 + 0S1 + 20L2 + 15M2 + 12S2 + 0L3 + 0M3 + 0S3 ≤ 12000  
# 0L1 + 0M1 + 0S1 + 0L2 + 0M2 + 0S2 + 20L3 + 15M3 + 12S3 ≤ 5000  
# L1 + 0M1 + 0S1 + L2 + 0M2 + 0S2 + L3 + 0M3 + 0S3 ≤ 900  
# 0L1 + M1 + 0S1 + 0L2 + M2 + 0S2 + 0L3 + M3 + 0S3 ≤ 1200  
# 0L1 + 0M1 + S1 + 0L2 + 0M2 + S2 + 0L3 + 0M3 + S3 ≤ 750  
  
# In matrix form, the constraints' coefficients can be expressed as  
# 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  
#   
# Creating the Matrix form for the constraints:   
f.con<- 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)  
  
#Seting the direction of inequalities constraints  
f.dir <- c("<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=")  
  
# seting the right hand side coefficients  
f.rhs = c(750,900,450,13000,12000,5000,900,1200,750)  
  
#Finding the value of Objective fUNCTION  
lp("max",f.obj,f.con,f.dir,f.rhs)

## Success: the objective function is 708000

#Getting the values of Variables  
lp("max",f.obj,f.con,f.dir,f.rhs)$solution

## [1] 350.0000 400.0000 0.0000 0.0000 400.0000 500.0000 0.0000 133.3333  
## [9] 250.0000

```