# LP Model Using R

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2022-09-23

Objective Function:The Objective function is to Maximize the profit (Z)

Max Z = 420L1 + 360M1 + 300S1 + 420L2 + 360M2 + 300S2 + 420L3 + 360M3 + 300S3

Where P1, P2, P3 are the Plant1, Plant2 and Plant3 and L, M, S be the sizes of the product. Therefore, Li,Mi,Si will be the sizes in planti where i=1,2,3

Subject to the below constraints:

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

The constraints are written as follows

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

Solving LP Model Using R

```
#install.packages('lpSolve', repos='http://cran.rstudio.com')

library(lpSolve)
#set objective function
```

```r
f.obj <- c(420,360,300,420,360,300,420,360,300)

#set inequality constraints in the form of matrix
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)

#set inequality signs
f.dir <- c("<=",
           "<=",
           "<=",
           "<=",
           "<=",
           "<=",
           "<=",
           "<=",
           "<=")

#set right hand side constants
f.rhs <- c(750,900,450,13000,12000,5000,900,1200,750)

#The objective function of the given problem is:

lp("max",f.obj, f.con, f.dir, f.rhs)
```

```
## Success: the objective function is 708000
```

```r
#variables for L1,M1,S1,L2,M2,S2,L3,M3,S3

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
```