

Assignment2

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R Markdown

title: "Assignment2"
output: pdf_document

```
setwd("C:/Users/haris/Documents/Fall 2022/Quantitative Management Modelling/Assignment 2")
```

#Further down, we need to specify the objective, constraints, direction, and constants in order to solve the problem.

Objective Function

The Objective function is to Max $Z = 420(L1 + L2 + L3) + 360(M1 + M2 + M3) + 300(S1 + S2 + S3)$

It can be written as $Z = 420L1 + 360M1 + 300S1 + 420L2 + 360M2 + 300S2 + 420L3 + 360M3 + 300S3$

$$L1 + M1 + S1 \leq 750$$

$$L2 + M2 + S2 \leq 900$$

$$L3 + M3 + S3 \leq 450$$

$$20L1 + 15M1 + 12S1 \leq 13000$$

$$20L2 + 15M2 + 12S2 \leq 12000$$

$$20L3 + 15M3 + 12S3 \leq 5000$$

$$L1 + L2 + L3 \leq 900$$

$$M1 + M2 + M3 \leq 1200$$

$$S1 + S2 + S3 \leq 750$$

Non Negativity Constraints

$$L1, L2, L3, M1, M2, M3, S1, S2, S3 \geq 0$$

The above constraints can be written as below

$$L1 + M1 + S1 + 0*L2 + 0*M2 + 0*S2 + 0*L3 + 0*M3 + 0*S3 \leq 750$$

$$OL1 + OM1 + OS1 + L2 + M2 + S2 + OL3 + OM3 + OS3 \leq 900$$

$$OL1 + OM1 + OS1 + OL2 + OM2 + OS2 + L3 + M3 + S3 \leq 450$$

$$20L1 + 15M1 + 12S1 + OL2 + OM2 + OS2 + OL3 + OM3 + OS3 \leq 13000$$

$$OL1 + OM1 + OS1 + 20L2 + 15M2 + 12S2 + OL3 + OM3 + OS3 \leq 12000$$

$$OL1 + OM1 + OS1 + OL2 + OM2 + OS2 + 20L3 + 15M3 + 12S3 \leq 5000$$

$$L1 + OM1 + OS1 + L2 + OM2 + OS2 + L3 + OM3 + OS3 \leq 900$$

$$OL1 + M1 + OS1 + OL2 + M2 + OS2 + OL3 + M3 + OS3 \leq 1200$$

$$OL1 + OM1 + S1 + OL2 + OM2 + S2 + OL3 + OM3 + S3 \leq 750$$

```
library("lpSolve")
#Defining the Objective Function - f.obj

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

#Defining the Constraints - f.con

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=T)

#Defining the Direction of the constraints - f.dir

f.dir <- c('<=',
          '<=',
          '<=',
          '<=',
          '<=',
          '<=',
          '<=',
          '<=',
          '<=')
```

```
#Defining the constants i.e. the right hand side values - f.rhs
```

```
f.rhs <- c(750,900,450,13000,12000,5000,900,1200,750)
```

```
#Calling the lp function to solve the problem basing the objective function i.e. to maximize the profit.
```

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

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

```
#Calling the lp function again to get the values for the variables defined above
```

```
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
```