Quantitative Management Assignment 04

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```
#install.packages("lpSolve")
library("lpSolve") #Activating the lpSolve Package
```

Further going down in order to solve the problem we need to define the objective, constraints, direction and constants

Objective Function

The Objective function$Max \quad Z = 420(X_1L + X_2L + x_3L) + 360(X_1M + X_2M + X_3M) + 300(X_1S + X_2S + X_3S)$

Subject to the following constraints

$$X_1L + X_1M + X_1S \le 750$$
$$X_2L + X_2M + X_2S \le 900$$
$$X_3L + X_3M + X_3S \le 450$$
$$20X_1L + 15X_1M + 12X_1S \le 13000$$
$$20X_2L + 15X_2M + 12X_2S \le 12000$$
$$20X_3L + 15X_3M + 12X_3S \le 5000$$
$$X_1L + X_2L + X_3L \le 900$$
$$X_1M + X_2M + X_3M \le 1200$$
$$X_1S + X_2S + X_3S \le 750$$

Non Negativity Constraints

$$X_1L, X_2L, X_3L, X_1M, X_2M, X_3M, X_1S, X_2S, X_3S \ge 0$$

constraints

$$X_1L + X_1M + X_1S + 0X_2L + 0X_2M + 0X_2S + 0X_3L + 0X_3M + 0X_3S \le 750$$
$$0X_1L + 0X_1M + 0X_1S + X_2L + X_2M + X_2S + 0X_3 + 0X_3M + 0X_3S \le 900$$
$$0X_1L + 0X_1M + 0X_1S + 0X_2L + 0X_2M + 0X_2S + X_3L + X_3M + X_3S \le 450$$
$$20X_1L + 15X_1M + 12X_1S + 0X_2L + 0X_2M + 0X_2S + 0X_3L + 0X_3M + 0X_3S \le 13000$$
$$0X_1L + 0X_1M + 0X_1S + 20X_2L + 15X_2M + 12X_2S + 0X_3L + 0X_3M + 0X_3S \le 12000$$
$$0X_1L + 0X_1M + 0X_1S + 0X_2L + 0X_2M + 0X_2S + 20X_3L + 15X_3M + 12X_3S \le 5000$$
$$X_1L + 0X_1M + 0X_1S + X_2L + 0X_2M + 0X_2S + X_3L + 0X_3M + 0X_3S \le 900$$
$$0X_1L + X_1M + 0X_1S + 0X_2L + X_2M + 0X_2S + 0M_3L + X_3M + 0X_3S \le 1200$$
$$0X_1L + 0X_1M + X_1S + 0X_2L + 0X_2M + X_2S + 0X_3L + 0X_3M + X_3S \le 750$$

Objective Function - f.obj

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

Defining 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 constraints - f.dir

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

constants of the right hand side - f.rhs

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

lp function to solve the problem the objective function to maximize

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

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

the lp function to get the values of the 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
```