

# Module 4 - Solve LP Model Using R

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## Load libraries

```
library(lpSolve)
library(lpSolveAPI)
```

## Objective function with 9 variables, each plant, and size combination

```
lprec <- make.lp(0,9)
```

Create the Objective function and change to maximization (output hidden for ease of reading knit file)

```
set.objfn(lprec, c(300,360,420,300,360,420,300,360,420))
lp.control(lprec, sense='max')
```

## Add constraints for plant excess capacity

```
add.constraint(lprec,c(1,1,1,0,0,0,0,0,0),"<=",750)
add.constraint(lprec,c(0,0,0,1,1,1,0,0,0),"<=",900)
add.constraint(lprec,c(0,0,0,0,0,0,1,1,1),"<=",450)
```

## Add constraints for product demand per day

```
add.constraint(lprec,c(1,0,0,1,0,0,1,0,0),"<=",750)
add.constraint(lprec,c(0,1,0,0,1,0,0,1,0),"<=",1200)
add.constraint(lprec,c(0,0,1,0,0,1,0,0,1),"<=",900)
```

## Add constraints for excess holding space for product at each plant

```
add.constraint(lprec,c(12,15,20,0,0,0,0,0,0),"<=",13000)
add.constraint(lprec,c(0,0,0,12,15,20,0,0,0),"<=",12000)
add.constraint(lprec,c(0,0,0,0,0,0,12,15,20),"<=",5000)
```

## Add constraints for equal labor distribution across plants

```
add.constraint(lprec,c(6,6,6,-5,-5,-5,0,0,0),"=",0)
add.constraint(lprec,c(0,0,0,-5,-5,-5,10,10,10),"=",0)
```

## Add variable and constraint names

```
ColNames <- c("Plant1_Small","Plant1_Medium","Plant1_Large","Plant2_Small","Plant2_Medium","Plant2_Large")
RowNames <- c("Plant1_capacity","Plant2_capacity","Plant3_capacity","Small_demand","Medium_demand","Large_demand")
dimnames(lprec) <- list(RowNames,ColNames)
```

## Print out the model

```
lprec
```

```
## Model name:
## a linear program with 9 decision variables and 11 constraints
```

## Solve the LP problem

```
solve(lprec)
```

```
## [1] 0
```

## Objective and variables that deliver the optimal objective value

```
get.objective(lprec)
```

```
## [1] 696000
```

```
get.variables(lprec)
```

```
## [1] 0.0000 177.7778 516.6667 166.6667 666.6667 0.0000 416.6667 0.0000
## [9] 0.0000
```

## Recommendation

Plant 1 should produce 177.8 medium size and 516.7 large size units per day

Plant 2 should produce 166.7 small size and 666.7 medium size units per day

Plant 3 should produce 416.7 small size units per day

The profit for this production schedule will be \$696,000 per day