Linear Optimization Using R

Abhay Padda

8 February 2018

# Linear Optimization Problem

#### A company wants to maximize the profit for two products A and B which are sold at $ 25 and $ 20 respectively. There are 1800 resource units available every day and product A requires 20 units while B requires 12 units. Both of these products require a production time of 4 minutes and total available working hours are 8 in a day. What should be the production quantity for each of the products to maximize profits.

### The objective function in the above problem will be:

#### max(Sales) = max(25 x1 + 20 x2)

#### where,

#### x1 is the units of Product A produced

#### x2 is the units of Product B produced

#### x1 and x2 are also called the decision variables

### The constraints (resource and time) in the problem:

#### 20x1 + 12 x2 <= 1800 (Resource Constraint)

#### 4x1 + 4x2 <= 8\*60 (Time constraint)

## Load the package lpsolve  
library(lpSolve)  
  
## Set the coefficients of the decision variables  
objective.in <- c(25, 20)  
  
## Create constraint martix  
const.mat <- matrix(c(20, 12, 4, 4), nrow=2, byrow=TRUE)  
  
## define constraints  
time\_constraint <- (8\*60)  
resource\_constraint <- 1800  
  
## RHS for the constraints  
const.rhs <- c(resource\_constraint, time\_constraint)  
  
## Constraints direction  
const.dir <- c("<=", "<=")  
  
## Find the optimal solution  
optimum <- lp(direction="max", objective.in, const.mat, const.dir, const.rhs)

## Display the optimum values for x1 and x2  
optimum$solution

## [1] 45 75

## Check the value of objective function at optimal point  
optimum$objval

## [1] 2625

#### From the above output, we can see that the company should produce 45 units of Product A and 75 units of Product B to get sales of $2625, which is the maximum sales that company can get given the constraints.