QMM Assignment

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# Question 1 : Formulate and solve the transportation Problem using R   
Prob= matrix(c(22,14,30,600,100,  
 16,20,24,625,120,  
 80,60,70,"-","-"),ncol=5,byrow=TRUE)  
colnames(Prob)=c("Warehouse 1","Warehouse 2","Warehouse 3","Production cost","Production capacity")  
rownames(Prob)=c("Plant A","Plant B","Demand")  
Prob

## Warehouse 1 Warehouse 2 Warehouse 3 Production cost  
## Plant A "22" "14" "30" "600"   
## Plant B "16" "20" "24" "625"   
## Demand "80" "60" "70" "-"   
## Production capacity  
## Plant A "100"   
## Plant B "120"   
## Demand "-"

# Min TC = 22x11 + 14x12 + 30x13 + 16x21 + 20x22 + 24x23  
  
# Subject to  
# supply Constraints  
 # x11 + x12 + x13 <= 100  
 # x21 + x22 + x23 <= 120  
# Demand Constraints  
 # x11 + x21 >= 80  
 # x12 + x22 >= 60  
 # x13 + x23 >= 70  
  
library(lpSolve)  
costs = matrix(c(622,614,630,0,  
 641,645,649,0), ncol=4, byrow= TRUE)  
#Since Production capacity and Demand values are unbalanced, we are creating a dummy column of the value 10  
#column names and row names are mentioned as:  
colnames(costs) = c("Warehouse 1","Warehouse 2","Warehouse 3","dummy")  
rownames(costs) = c("Plant A","Plant 2")  
costs

## Warehouse 1 Warehouse 2 Warehouse 3 dummy  
## Plant A 622 614 630 0  
## Plant 2 641 645 649 0

#Setting up row signs and production capacity values  
row.signs= rep("<=",2)  
row.rhs= c(100,120)  
  
#setting up column signs and demand values  
col.signs=rep(">=",4)  
col.rhs=c(80,60,70,10)  
  
#Running lptrans command to find the minimum cost  
lptrans <- lp.transport(costs, "min", row.signs, row.rhs, col.signs, col.rhs)  
  
#Variables for the given Prob  
lptrans$solution

## [,1] [,2] [,3] [,4]  
## [1,] 0 60 40 0  
## [2,] 80 0 30 10

# Objective function is  
lptrans$objval

## [1] 132790

# Therefore  
 # x12 = 60  
 # x13 = 40  
 # x21 = 80  
 # x23 = 30  
 # and objective function is 132790