

Transportation Assignment 6

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

Model name: a linear program with 6 decision variables and 5 constraints

```
/* Objective function */ min: (22+600) x11 + (14+600) x12 + (30+600) x13 + (16+625) x21 + (20+625) x22 + (24+625) x23
```

```
/* Constraints */
```

```
x11 + x12 + x13 <=100 x21 + x22 + x23 <=120 x11 + x21 =80 x12 + x21 =60 x13 + x23 =70
```

Now, load the library

```
library(lpSolveAPI)
```

Let us set up the Heart Start transportation problem. We have 6 decision variables, and 5 constraints. In the first formulation, we will directly create the objective function and constraints.

```
# make an lp object with 0 constraints and 6 decision variables
```

```
lprec <- make.lp(0, 6)
```

```
# Creating objective function. The default is a minimization problem.
```

```
set.objfn(lprec, c(622,614,630,641,645,649))
```

```
# As the default is a minimization problem, so no need to change the direction
```

```
# Add the constraints
```

```
#Plant production Capacity constraints
```

```
add.constraint(lprec, c(1, 1, 1, 0, 0, 0), "<=", 100)
```

```
add.constraint(lprec, c(0, 0, 0, 1, 1, 1), "<=", 120)
```

```
#Warehouse demand constraints
```

```
add.constraint(lprec, c(1, 0, 0, 1, 0, 0), "=", 80)
```

```
add.constraint(lprec, c(0, 1, 0, 0, 1, 0), "=", 60)
```

```
add.constraint(lprec, c(0, 0, 1, 0, 0, 1), "=", 70)
```

```
# Set bounds for variables explicitly.
```

```
set.bounds(lprec, lower = c(0, 0, 0, 0, 0, 0), columns = c(1, 2,3,4,5,6))
```

```
# set variable names and name the constraints
```

```

RowNames <- c("PlantAProdCap", "PlantBProdCap", "Ware1Demand", "Ware2Demand", "Ware3Demand")

ColNames <- c("PlantAWar1Quant", "PlantAWar2Quant", "PlantAWar3Quant", "PlantBWar1Quant", "PlantBWar2Quant")

dimnames(lprec) <- list(RowNames, ColNames)

# Now, print out the model
lprec

## Model name:
##           PlantAWar1Quant PlantAWar2Quant PlantAWar3Quant PlantBWar1Quant PlantBWar2Quant
## Minimize           622           614           630           641           645
## PlantAProdCap           1           1           1           0           0
## PlantBProdCap           0           0           0           1           1
## Ware1Demand            1           0           0           1           0
## Ware2Demand            0           1           0           0           1
## Ware3Demand            0           0           1           0           0
## Kind                  Std                  Std                  Std                  Std                  Std
## Type                  Real                  Real                  Real                  Real                  Real
## Upper                  Inf                  Inf                  Inf                  Inf                  Inf
## Lower                  0                   0                   0                   0                   0

# The model can also be saved to a file
write.lp(lprec, filename = "HeartStart.lp", type = "lp")

```

We now solve the above LP problem

```
solve(lprec)
```

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

We now output the value of the objective function, and the variables

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

```
## [1] 132790
```

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

```
## [1] 0 60 40 80 0 30
```

```

x <- read.lp("HeartStart.lp") # create an lp object x
x                               # display x

```

```

## Model name:
##           PlantAWar1Quant PlantAWar2Quant PlantAWar3Quant PlantBWar1Quant PlantBWar2Quant
## Minimize           622           614           630           641           645
## PlantAProdCap           1           1           1           0           0
## PlantBProdCap           0           0           0           1           1
## Ware1Demand            1           0           0           1           0
## Ware2Demand            0           1           0           0           1
## Ware3Demand            0           0           1           0           0
## Kind                  Std                  Std                  Std                  Std                  Std
## Type                  Real                  Real                  Real                  Real                  Real
## Upper                  Inf                  Inf                  Inf                  Inf                  Inf
## Lower                  0                   0                   0                   0                   0

```

Solve the lp model

```
solve(x)

## [1] 0

get.objective(x)      # get objective value

## [1] 132790

get.variables(x)      # get values of decision variables

## [1]  0 60 40 80  0 30

get.constraints(x)     # get constraint RHS values

## [1] 100 110  80  60  70
```