

Assignment_2

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library(lpSolveAPI)

setwd("~/Documents/Quant Assignment 2/Quant_assignment2")

# make an lp object with 0 constraints and 9 decision variables
lprec <- make.lp(0, 9)
lprec

## Model name:
##   a linear program with 9 decision variables and 0 constraints

# Create the objective function and since we need to maximize profit, change the sense to max.
set.objfn(lprec, c(420, 360, 300, 420, 360, 300, 420, 360, 300))
lp.control(lprec, sense='max')

## $anti.degen
## [1] "none"
##
## $basis.crash
## [1] "none"
##
## $bb.depthlimit
## [1] -50
##
## $bb.floorfirst
## [1] "automatic"
##
## $bb.rule
## [1] "pseudononint" "greedy"      "dynamic"      "rcostfixing"
##
## $break.at.first
## [1] FALSE
##
## $break.at.value
## [1] 1e+30
##
## $epsilon
##      epsb      epsd      epsel      epsint  epsperturb  epspivot
##    1e-10    1e-09    1e-12    1e-07      1e-05      2e-07
##
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## $improve
## [1] "dualfeas" "thetagap"
##
## $infinite
## [1] 1e+30
##
## $maxpivot
## [1] 250
##
## $mip.gap
## absolute relative
##      1e-11      1e-11
##
## $negrange
## [1] -1e+06
##
## $obj.in.basis
## [1] TRUE
##
## $pivoting
## [1] "devex"      "adaptive"
##
## $presolve
## [1] "none"
##
## $scalelimit
## [1] 5
##
## $scaling
## [1] "geometric"  "equilibrate" "integers"
##
## $sense
## [1] "maximize"
##
## $simplextype
## [1] "dual"      "primal"
##
## $timeout
## [1] 0
##
## $verbose
## [1] "neutral"

# Add the constraints
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.constraint(lprec, c(20, 15, 12, 0, 0, 0, 0, 0, 0), "<=", 13000)
add.constraint(lprec, c(0, 0, 0, 20, 15, 12, 0, 0, 0), "<=", 12000)
add.constraint(lprec, c(0, 0, 0, 0, 0, 0, 20, 15, 12), "<=", 5000)
add.constraint(lprec, c(1, 1, 1, 0, 0, 0, 0, 0, 0), "<=", 900)
add.constraint(lprec, c(0, 0, 0, 1, 1, 1, 0, 0, 0), "<=", 1200)
add.constraint(lprec, c(0, 0, 0, 0, 0, 0, 1, 1, 1), "<=", 750)
add.constraint(lprec, c(6, 6, 6, -5, -5, -5, 0, 0, 0), "=", 0)

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add.constraint(lprec, c( 3, 3, 3, 0, 0, 0, -5, -5, -5), "=", 0)

#set.bounds(lprec, lower = c(0, 0, 0, 0, 0, 0, 0, 0, 0), columns = c(1, 2,3,4,5,6,7,8,9))

# To identify the variables and constraints, we can set variable names and name the constraints
RowNames <- c("CapCon1", "CapCon2", "CapCon3", "StoCon1", "StoCon2", "StoCon3", "SalCon1", "SalCon2", "SalCon3")
ColNames <- c("P1Large", "P1Medium", "P1Small", "P2Large", "P2Medium", "P2Small", "P3Large", "P3Medium", "P3Small")
dimnames(lprec) <- list(RowNames, ColNames)

lprec

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

write.lp(lprec, filename = "A2QMM.lp", type = "lp")

solve(lprec)

## [1] 0

get.objective(lprec)

## [1] 696000

get.variables(lprec)

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

```