Module 9 assignment

Tongxiang Lu

2022-11-05

```
library(lpSolveAPI)
```

Emax co.

** We have two constraints(employment constraints and ernings next year) and 7 variables(X1,X2,X3,Y1p,Y1m,Y2p,Y2m).

```
lprec <- make.lp(2,7)
```

Setting objective functions.

```
set.objfn(lprec, c(20,15,25, -6,-6,0,-3))
```

Objective function is to maximize.

```
lp.control(lprec, sense='max')
```

```
## $anti.degen
## [1] "fixedvars" "stalling"
##
## $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
##
## $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"
```

```
lp.control(lprec, sense='max')
```

```
## $anti.degen
## [1] "fixedvars" "stalling"
```

```
##
## $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
##
## $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"
```

```
set.row(lprec, 1, c(6,4,5,-1,1,0,0), indices=c(1,2,3,4,5,6,7))
rhs <- c(50,75)
set.rhs(lprec, rhs)
set.constr.type(lprec, c("=",">="))
set.bounds(lprec, lower=rep(0,7))
lp.rownames <- c("Emp", "Nextyear")
lp.colnames <- c("x1", "x2","x3","y1p","y1m","y2p","y2m")
dimnames(lprec)<- list(lp.rownames,lp.colnames)
lprec
```

```
## Model name:
##             x1    x2    x3   y1p   y1m   y2p   y2m
## Maximize    20    15    25    -6    -6     0    -3
## Emp          6     4     5    -1     1     0     0   =  50
## Nextyear     0     0     0     0     0     0     0  >=  75
## Kind       Std   Std   Std   Std   Std   Std   Std
## Type      Real  Real  Real  Real  Real  Real  Real
## Upper      Inf   Inf   Inf   Inf   Inf   Inf   Inf
## Lower        0     0     0     0     0     0     0
```

```
write.lp(lprec, filename="emax.lp", type="lp")
solve(lprec)
```

```
## [1] 2
```

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

```
## [1] -1e+30
```

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

```
## [1] 6.951905e-310 4.792437e-322 4.100745e-322 8.657365e-312 8.657001e-312
## [6] 8.657365e-312 8.657001e-312
```

```
get.constraints(lprec)
```

```
## [1] 8.657001e-312 8.657381e-312
```

Set values for the rows

```
set.row(lprec, 1, c(6,4,5,-1,1,0,0), indices=c(1,2,3,4,5,6,7))
set.row(lprec, 2, c(8,7,5,0,0,-1,1), indices=c(1,2,3,4,5,6,7))
```

Left hand constraints

```
set.constr.type(lprec, c("=",">="))
set.bounds(lprec, lower=rep(0,7))
```

Right hand values.

```
rhs <- c(50,75)
set.rhs(lprec, rhs)
```

Save this into a file.

```
write.lp(lprec,filename="emax.lp", type="lp")
```

Solving the model.

```
solve(lprec)
```

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

```
lprec
```

```
## Model name:
##                           x1                x2                x3               y1p                y
## Maximize                  20                15                25                -6
## Emp                        6                 4  5.00000000000047 -1.00000000000009  1.000000000000
## Nextyear   8.00000000000541  7.00000000000333  4.99999999999812                 0
## Kind                    Std               Std               Std               Std                S
## Type                   Real              Real              Real              Real               Re
## Upper                   Inf               Inf               Inf               Inf                I
## Lower                     0                 0                 0                 0
```

We find the value of objective function, variables, constraints.

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

```
## [1] 225
```

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

```
## [1]  0  0 15 25  0  0  0
```

```
get.constraints(lprec)
```

```
## [1] 50 75
```