Ecurley_6

```
library(lpSolveAPI)
```

We start with an LP model that has 6 variables. One for each of the costs associated with shipping between warehouses and factories. Then we indicated the costs (I started with Plant A, Then Plant B)

I added either 600 or 625 to each of the variables because that is the unit cost per item in Plant A and B Respectively

Next I added 2 additional variables as dumby variables. This is because the total demand from the warehouses is 210, yet the total supply is 220. I have to add a dumby warehouse to account for the difference.

I also set the cost of using this dumby variable to 0 since we don't know the shipping cost, only the production value.

Finally we indiacte that the overall function is going to be a minimization of the cost.

```
lprec <- make.lp(0,8)
set.objfn(lprec, c(22+600, 14+600, 30+600, 0+600,
                   16+625, 20+625, 24+625, 0+625))
lp.control(lprec, sense='min')
```

```
## $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] "minimize"
##
## $simplextype
## [1] "dual"   "primal"
##
## $timeout
## [1] 0
##
## $verbose
## [1] "neutral"
```

Next I added two constraints. These constraints ensure that the production matches the production per plant.

```
add.constraint(lprec, c(1,1,1,1,0,0,0,0), "=", 100)
add.constraint(lprec, c(0,0,0,0,1,1,1,1), "=", 120)
```

Then I added 4 constraints to meet the demand from the warehouses.

```
add.constraint(lprec, c(1,0,0,0,1,0,0,0), "=", 80)
add.constraint(lprec, c(0,1,0,0,0,1,0,0), "=", 60)
add.constraint(lprec, c(0,0,1,0,0,0,1,0), "=", 70)
add.constraint(lprec, c(0,0,0,1,0,0,0,1), "=", 10)
```

Next I set the lower bound of all the constratints to 0

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

We can then set the names of the outputs

```
Rownames <- c("Production Cap Plant A", "Production Cap Plant B", "Demand Warehouse 1", "Demand Warehous

ColNames <- c("PlantA->W1", "PlantA->W2", "PlantA->W3", "PlantA->W4",
              "PlantB->W1", "PlantB->W2", "PlantB->W3", "PlantB->W4")

dimnames(lprec) <- list(Rownames, ColNames)
```

```
lprec
```

```
## Model name:
##                          PlantA->W1  PlantA->W2  PlantA->W3  PlantA->W4  PlantB->W1  PlantB->W2  Plan
## Minimize                        622         614         630         600         641         645
## Production Cap Plant A            1           1           1           1           0           0
## Production Cap Plant B            0           0           0           0           1           1
## Demand Warehouse 1                1           0           0           0           1           0
## Demand Warehouse 2                0           1           0           0           0           1
## Demand Warehouse 3                0           0           1           0           0           0
## Demand Warehouse 4                0           0           0           1           0           0
## Kind                            Std         Std         Std         Std         Std         Std
## Type                           Real        Real        Real        Real        Real        Real
## Upper                           Inf         Inf         Inf         Inf         Inf         Inf
## Lower                             0           0           0           0           0           0
```

```
solve(lprec)
```

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

We can see that the minimum cost to ship is 138,980 and the number of items to be shipped to each warehouse.

Starting from Left to Right Plant A will ship 30, 60, 0, & 10 items to Warehouses 1-4 respectively. Plant B will ship 50, 0, 70, & 0 items to Warehosues 1-4 respectively.

Since Warehouse 4 doesn't exist we will not be shipping those 10 items from PlantA

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

```
## [1] 138980
```

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

```
## [1] 30 60  0 10 50  0 70  0
```