MIS 64018 - Assignment 7

Ryan Harris

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Load library

```
library(lpSolveAPI)
```

```
## Warning: package 'lpSolveAPI' was built under R version 4.0.3
```

Create the lp model

```
rn <- make.lp(0, 7) # number of constraints, number of decision variables
lp.control(rn, sense="min", verbose = "neutral") # Default is minimization, so we need to do this for M
```

```
## $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"
```

```
set.objfn(rn, c(775, 800, 800, 800, 800, 775, 750))
set.type(rn,1:7,type="integer")
add.constraint(rn, c(0, 1, 1, 1, 1, 1, 0), ">=", 18)
add.constraint(rn, c(0, 0, 1, 1, 1, 1, 1), ">=", 27)
add.constraint(rn, c(1, 0, 0, 1, 1, 1, 1), ">=", 22)
add.constraint(rn, c(1, 1, 0, 0, 1, 1, 1), ">=", 26)
add.constraint(rn, c(1, 1, 1, 0, 0, 1, 1), ">=", 25)
add.constraint(rn, c(1, 1, 1, 1, 0, 0, 1), ">=", 21)
add.constraint(rn, c(1, 1, 1, 1, 1, 0, 0), ">=", 19)
RowNames <- c("Sunday","Monday","Tuesday","Wednesday","Thursday","Friday","Saturday")
ColNames <- c("Shift1", "Shift2", "Shift3", "Shift4", "Shift5", "Shift6", "Shift7")
dimnames(rn) <- list(RowNames, ColNames)
rn
```

```
## Model name:
##            Shift1  Shift2  Shift3  Shift4  Shift5  Shift6  Shift7
## Minimize      775     800     800     800     800     775     750
## Sunday          0       1       1       1       1       1       0  >=  18
## Monday          0       0       1       1       1       1       1  >=  27
## Tuesday         1       0       0       1       1       1       1  >=  22
```

```
## Wednesday       1       1       0       0       1       1       1  >=  26
## Thursday        1       1       1       0       0       1       1  >=  25
## Friday          1       1       1       1       0       0       1  >=  21
## Saturday        1       1       1       1       1       0       0  >=  19
## Kind          Std     Std     Std     Std     Std     Std     Std
## Type          Int     Int     Int     Int     Int     Int     Int
## Upper         Inf     Inf     Inf     Inf     Inf     Inf     Inf
## Lower           0       0       0       0       0       0       0
```

Solve the lp model

```
solve(rn)
```

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

Find Total Cost

```
get.objective(rn)
```

```
## [1] 25675
```

Get Number of Workers Each Day

```
get.variables(rn)
```

```
## [1]  2  4  5  0  8  1 13
```

Based on above:
Sunday: 18
Monday: 27
Tuesday: 24
Wednesday: 28
Thursday: 25
Friday: 24
Saturday: 19