Assignment 6

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Formulating lp model problem

Objective function:

Minimize Z : 775x1 + 800x2 + 800x3 + 800x4 + 800x5 + 775x6 + 750x7

Constraints

$$0x1 + x2 + x3 + x4 + x5 + x6 + 0x7 >= 18$$
$$0x1 + 0x2 + x3 + x4 + x5 + x6 + x7 >= 27$$
$$x1 + 0x2 + 0x3 + x4 + x5 + x6 + x7 >= 22$$
$$x1 + x2 + 0x3 + 0x4 + x5 + x6 + x7 >= 26$$
$$x1 + x2 + x3 + 0x4 + 0x5 + x6 + x7 >= 25$$
$$x1 + x2 + x3 + x4 + 0x5 + 0x6 + x7 >= 21$$
$$x1 + x2 + x3 + x4 + x5 + 0x6 + 0x7 >= 19$$

for all

$$x1, x2, x3, x4, x5, x6, x7 >= 0$$

```
#Reading lp file

library(lpSolveAPI)
shipdata<- read.lp("AP-Shipping.lp")
shipdata
```

```
## Model name:
##             x1   x2   x3   x4   x5   x6   x7
## 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
```

Solving the lp model to find optimal numnber of workers

```
solve(shipdata)
```

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

```
get.objective(shipdata)
```

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

```
get.variables(shipdata)
```

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

Objective function =25675 ie. Total cost of labours

```
workers<- matrix(c(0,4,5,0,8,1,0,0,0,5,0,8,1,13,2,0,0,0,8,1,13,2,4,0,0,8,1,13,2,4,5,0,0,1,13,2,3,4,0,0,0
row.names(workers) <- c('Sun','Mon','Tues','Wed','Thur','Fri','Sat')
colnames(workers)<- c('Sun/Mon','Mon/Tues','Tues/Wed','Wed/Thur','Thur/Fri','Fri/Sat','Sat/Sun')
workers
```

```
##      Sun/Mon Mon/Tues Tues/Wed Wed/Thur Thur/Fri Fri/Sat Sat/Sun
## Sun        0        4        5        0        8       1       0
## Mon        0        0        5        0        8       1      13
## Tues       2        0        0        0        8       1      13
## Wed        2        4        0        0        8       1      13
## Thur       2        4        5        0        0       1      13
## Fri        2        3        4        0        0       0      13
## Sat        2        4        5        0        8       0       0
```

Workers should be assigned with given number of shifts in the factory in a week to minimize the total labor expenses

```
rowSums(workers)
```

```
##  Sun  Mon Tues  Wed Thur  Fri  Sat
##   18   27   24   28   25   22   19
```

Number of workers required according to the scheduled shift for each day to minimize the total labor wage expenses