rspake1_11

Assignment Instructions

AP is a shipping service that guarantees overnight delivery of packages in the continental US. The company has various hubs at major cities and airports across the country. Packages are received at hubs, and then shipped to intermediate hubs or to their final destination.

The manager of the AP hub in Cleveland is concerned about labor costs, and is interested in determining the most effective way to schedule workers. The hub operates seven days a week, and the number of packages it handles varies from one day to another.

Package handlers at AP are guaranteed a five-day work week with two consecutive days off. The base wage for the handlers is $750 per week. Workers working on Saturday or Sunday receive an additional $25 per day.

The manager wants to keep the total wage expenses as low as possible while ensuring that there are sufficient number of workers available each day. Formulate and solve the problem. What was the total cost? How many workers are available each day?

Hint: The number of available workers each day can exceed, but can not be below the required amount.

```
library(lpSolveAPI)
```

```
## Warning: package 'lpSolveAPI' was built under R version 4.1.1
```

```
Ip_staff <- read.lp("C:/Users/rspake1/Desktop/CSV files/Assignments/Quantitative management mode
ling/AP_staffing.lp")

Ip_staff
```

```
## Model name:
##             Shift1  Shift2  Shift3  Shift4  Shift5  Shift6  Shift  Shift7
## Minimize       775     800     800     800     800     775    750       0
## Sunday           0       1       1       1       1       1      0       0   >=   18
## Monday           0       0       1       1       1       1      0       1   >=   27
## Tuesday          1       0       0       1       1       1      0       1   >=   22
## Wednesday        1       1       0       0       1       1      0       1   >=   26
## Thursday         1       1       1       0       0       1      0       1   >=   25
## Friday           1       1       1       1       0       0      0       1   >=   21
## Saturday         1       1       1       1       1       0      0       0   >=   19
## Kind           Std     Std     Std     Std     Std     Std    Std     Std
## Type           Int     Int     Int     Int     Int     Int   Real     Int
## Upper          Inf     Inf     Inf     Inf     Inf     Inf    Inf     Inf
## Lower            0       0       0       0       0       0      0       0
```

```
solve(Ip_staff)
```

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

```
get.objective(Ip_staff)
```

```
## [1] 15182
```

```
get.variables(Ip_staff)
```

```
## [1]  1  8  0  0 10  0  0 17
```

```
get.constraints(Ip_staff)
```

```
## [1] 18 27 28 36 26 26 19
```

Conclusion

Total Cost = $15,182

Daily Staffing:

Sunday = 18 Monday = 27 Tuesday = 28 Wednesday = 36 Thursday = 26 Friday = 26 Saturday = 19