Assignment 11

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```
rm(list=ls())
```

```
library(lpSolveAPI)
library(kableExtra)
```

```
ip <- read.lp("worker.lp")
ip
```

```
## Model name:
##            x1   x2   x3   x4   x5   x6   x7
## Minimize  775  800  800  800  800  775  750
## R1          0    1    1    1    1    1    0  >=  18
## R2          0    0    1    1    1    1    1  >=  27
## R3          1    0    0    1    1    1    1  >=  22
## R4          1    1    0    0    1    1    1  >=  26
## R5          1    1    1    0    0    1    1  >=  25
## R6          1    1    1    1    0    0    1  >=  21
## R7          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(ip)
```

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

```
get.objective(ip)
```

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

```
get.variables(ip)
```

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

SUMMARY OF RESULTS

Objective Function Minimization

- The lowest weekly employee cost is **$25,675.**

Table 1: Most Employees Work Shifts 5 and 7

Shift	Employees
1	2
2	4
3	5
4	0
5	8
6	1
7	13

Employees Working Each Shift Per Day

```
Shift <- c(1:7)
Employees <- c(2, 4, 5, 0, 8, 1, 13)
table1 <- cbind(Shift, Employees)

table1 %>%
         kbl(caption = "Most Employees Work Shifts 5 and 7") %>%
        kable_classic(full_width = FALSE) %>%
        kable_styling(bootstrap_options = "striped", position = "center") %>%
       column_spec(1, bold = TRUE) %>%
        row_spec(1, color = "white", background = "#41B3A3") %>%
        row_spec(2, color = "white", background = "#41B3A3") %>%
        row_spec(3, color = "white", background = "#41B3A3") %>%
        row_spec(4, color = "white", background = "#41B3A3") %>%
        row_spec(5, bold = T, background = "#C38D9E") %>%
        row_spec(6, color = "white", background = "#41B3A3") %>%
        row_spec(7, bold = T, background = "#C38D9E") %>%
        row_spec(0, bold = T)
```

Table 1: Explanation: Shift 7 has the highest number of employees working due to it being the lowest cost of weekly wage of $750. Shift 5 has a higher amount due to needing to make sure the weekend employee constraint was met for Saturday.

Total Employees Working Per Day

```
Days <- c("Sun", "Mon", "Tues", "Wed", "Thurs", "Fri", "Sat")
Tot_Employees <- c(18, 27, 24, 28, 25, 24, 19)
table2 <- cbind(Days, Tot_Employees)

table2 %>%
        kbl(caption = "Most Employees Are Working on Week Days") %>%
        kable_classic(full_width = FALSE) %>%
        kable_styling(bootstrap_options = "striped", position = "center") %>%
       column_spec(1, bold = TRUE) %>%
        row_spec(1, color = "white", background = "#B22222") %>%
```

Table 2: Most Employees Are Working on Week Days

Days	Tot_Employees
Sun	18
Mon	27
Tues	24
Wed	28
Thurs	25
Fri	24
Sat	19

```
        row_spec(2:6, background = "#97CAEF") %>%
        row_spec(7, color = "white", background = "#B22222") %>%
        row_spec(0, bold = T)
```

Table 2: Explanation: The algorithm met exactly the constraints for Sat. and Sun. to minimize costs on the more expensive days for the company.