

Assignment 5 module 9

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1. Express y_1^+ and y_1^- ; y_2^+ and y_2^- ; P using x_1 , x_2 , x_3

$$y_1^+ - y_1^- = 50 - 6x_1 - 4x_2 - 5x_3;$$

$$y_2^+ - y_2^- = 75 - 8x_1 - 7x_2 - 5x_3;$$

$$P = 20x_1 + 15x_2 + 25x_3;$$

2. Express management objective function

$$\text{Max } Z = 20x_1 + 15x_2 + 25x_3 - 6y_1^+ - 6y_1^- - 3y_2^-$$

3. Formulate and solve LP

```
library(lpSolveAPI)
gp_sl <- read.lp("dewright.lp")
gp_sl
```

```
## Model name:
##          x1    x2    x3    y1p    y1m    y2m    y2p
## Maximize  20    15    25     -6     -6     -3     0
## R1         6     4     5     -1      1      0      0 = 50
## R2         8     7     5      0      0      1     -1 = 75
## Kind      Std   Std   Std   Std   Std   Std   Std
## Type      Real  Real  Real  Real  Real  Real  Real
## Upper     Inf   Inf   Inf   Inf   Inf   Inf   Inf
## Lower      0    0    0     0     0     0     0
```

```
solve(gp_sl)
```

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

```
get.objective(gp_sl)
```

```
## [1] 225
```

```
get.variables(gp_sl)
```

```
## [1] 0 0 15 25 0 0 0
```

Conclusion

$Z = 225$ mil d, $x_1 = x_2 = 0$, $x_3 = 15$, $y_1^+ = 25$, $y_1^- = y_2^- = y_2^+ = 0$. Profit is $25 \times 15 = 375$ mil d. Employment is 7500 which has 2500 employees more than the goal so $y_1^+ = 25$, $y_1^- = 0$. Earnings next year is 75 millions of dollars which is the same with the goal so $y_2^- = y_2^+ = 0$.