Assignment 5 module 9

Aksa Taniya

11-06-2022

This document contains the code for all examples in the Goal Programming module

Dewright Co.

Solve

Remarks

The ideal solution to this formulation obtained by applying the simplex approach has the following values: y1m = 0, y2p = 8.33, y2m = 0, y3p = 0, x1 = 8.33, x2 = 0, x3 = 1, y1p = 0, and y3m = 0. can be The variables are listed in the formulation's order of appearance, followed by the solutions. Thus, y1 and y3 are both equal to 0. As a result, his first and third targets are entirely attained, while his hiring goal is exceeded by 8.33. (833 employees). Overachieving the intended result carries a 16.67 penalty. # Preemptive Goal Programming - Sequential Approach ## Dewright Co. - First Stage

Management went back to the initial problem statement outlined in the previous table after receiving unfavorable proposals to raise the company's staff by more than 20 percent. The extremely high cost of training 833 new hires has mostly been wasted, resulting in significant layoffs (a well-known certainly), making it challenging for businesses to recruit highly skilled workers in the country. Because of this, management came to the conclusion that preventing a workforce rise should be given very high priority. Additionally, management is aware that it will be extremely challenging for him to increase capital expenditures for new items above $55 million, making avoiding capital expenditures above that level very challenging as well. need to be higher priority. ### Formulation and Solution Z = 0, x1 = 8, and y3m = 15 is the answer. We can go on to the second stage of optimization now that we have the best answer by setting y2p and y3p = 0 in the second stage formulation. ## Dewright Co. - Second Stage We can end here because the optimal solution is special and doesn't call for any further objectives. In the end, x1 = 5, x2 = 0, and x3 = 3.75. The second priority goal (long-term profit >= 125) can only be met by 8.75 in full by this approach, but it fully satisfies the first priority goal (no unemployment). # Dewright Co. - Streamlined Approach In reality, there are two steps to this solution. The first priority goal is achieved, but the best option doesn't provide enough long-term advantages to meet the second priority goal. # Make maximum progress towards all goals

- Setting goals is a requirement for all goals in goal programming. What if some objectives are unrestricted? * Unrestricted targets have no minimum target (default). We therefore wish to simultaneously advance all objectives. Therefore, maximizing the minimal progress toward all goals is a good goal. **1. Express y1+ and y1-; y2+ and y2-; P using x1, x2, x3**

$$y_1^+ - y_1^- = 50 - 6x1 - 4x2 - 5x3;$$

$$y_2^+ - y_2^- = 75 - 8x1 - 7x2 - 5x3;$$

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

2. Express management objective function

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

3. Formulate and solve LP

```
library(lpSolveAPI)
gp_sl <- read.lp("C:/Users/Windows/Downloads/emax.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, x1=x2=0, x3=15, y1p=25, y1m=y2m=y2p=0.Profit is 25*15= 325 mil d. Employment is 7500 which has 2500 employees more than the goal so y1p=25, y1m=0. Earnings next year is 75 millions of dollars which is the same with the goal so y2m=y2p=0.