QMM GP

HARI VINAYAK

2023-11-26

##summary

1. **Production Optimization:**
   - We aimed to maximize production using variables (X1, X2, X3), but the result shows "0" for X1 and X2. This means we can't make 20 units of Product 1 and 15 units of Product 2. Now, our focus is on producing only 15 units of Product 3, which brings in the most revenue.
2. **Workforce Management:**
   - Despite targeting a workforce of 50 hundred employees, we exceeded it by 25 hundred employees (ytp), leading to penalties for surpassing employment limits.
3. **Financial Outlook:**
   - Looking ahead, both y2p and y2m are "0," indicating a stable financial forecast for the next year. There's no expected increase or decrease compared to the current fiscal year.
4. **Objective Function Result:**
   - The bottom line: $225 million. This number summarizes the financial impact of our production and workforce decisions.

```
library(lpSolveAPI)
```

```
x <- read.lp("GP.lp")
x
```

```
## 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

```
solve(x)
```

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

```
get.objective(x)
```

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

```
get.variables(x)
```

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

```
get.constraints(x)
```

```
## [1] 50 75
```

```
get.sensitivity.rhs(x)
```

```
## $duals
## [1]   6  -1  -8  -2   0   0 -12  -2  -1
##
## $dualsfrom
## [1] -1.0e+30  5.0e+01 -1.0e+30 -1.0e+30 -1.0e+30 -1.0e+30 -2.5e+01 -1.0e+30
## [9] -2.5e+01
##
## $dualstill
## [1] 7.500000e+01 1.000000e+30 9.375000e+00 8.333333e+00 1.000000e+30
## [6] 1.000000e+30 1.000000e+30 2.500000e+01 1.000000e+30
```

```
get.sensitivity.objex(x)
```

```
## $objfrom
## [1] -1.000000e+30 -1.000000e+30  2.357143e+01 -6.666667e+00 -1.000000e+30
## [6] -1.000000e+30 -1.000000e+30
##
## $objtill
## [1] 28 17 30 -5  6 -1  1
##
## $objfromvalue
## [1]  9.375000e+00  8.333333e+00 -1.000000e+30 -1.000000e+30 -1.000000e+30
## [6]  2.500000e+01 -1.000000e+30
##
## $objtillvalue
## [1] NA NA NA NA NA NA NA
```