Assignment-2:- The Transportation Model

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2023-10-02

Summary

1.The Northern Airplane Company used linear programming (LP) to optimize jet airplane production costs, resulting in a minimum cost of $77.3 million. 2.The LP model included 20 decision variables and 9 constraints, but violated the fundamental assumption of the transportation problem that supply must equal demand. 3.To address this, a dummy demand for 30 jet airplanes was introduced. 4.The LP model was solved using the "read.lp," "solve," and "get.objective" functions. 5.The decision variables were represented as "X(ij)," with the condition "i<=j" applied to ensure that 'i' is always less than or equal to 'j.' 6.Ultimately, the schedule developed for the production of engines in each of the four months can be utilized by the production manager. 7.The notations (Xij) signify the number of planes produced in month 'i' for month 'j,' with specific values assigned as follows: X11=10, X12=15, X23=5, X33=20, X34=10, and X44=10. 8.This production schedule can be used by the production manager to optimize jet airplane production.

```r
library(lpSolveAPI)
```

Making an Lp file and calling to read it:-

```r
x <- read.lp("C:/Users/ASUS/Desktop/QMM-ASSIGNMENT/classwork/12-oct-QMM.lp")
write.lp(x,"test.out")
x
```

```
## Model name:
##   a linear program with 20 decision variables and 9 constraints
```

solved the lp model

```r
solve(x)
```

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

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

```
## [1] 77.3
```

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

```
##  [1] 10 15  0  0  0  0  5  0  0  0 20 10  0  0  0 10  0 30  0  0
```

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

```
## [1] 25 35 30 10 10 15 25 20 30
```

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

```
## $objfrom
##  [1] -1.000e+30 -1.000e+30 -1.000e+30  1.125e+00  1.095e+00  1.110e+00
##  [7]  1.115e+00  1.140e+00  1.070e+00  1.085e+00  1.100e+00  1.115e+00
## [13]  1.085e+00  1.100e+00  1.115e+00 -1.000e+30 -1.500e-02 -1.000e+30
## [19] -2.500e-02 -1.000e-02
##
## $objtill
##  [1] 9.999985e+03 1.095000e+00 1.110000e+00 1.000000e+30 1.000000e+30
##  [6] 1.000000e+30 1.125000e+00 1.000000e+30 1.000000e+30 1.000000e+30
## [11] 1.100000e+00 1.115000e+00 1.000000e+30 1.000000e+30 1.000000e+30
## [16] 1.140000e+00 1.000000e+30 1.000000e-02 1.000000e+30 1.000000e+30
##
## $objfromvalue
##  [1] -1e+30 -1e+30  0e+00 -1e+30  0e+00  0e+00 -1e+30  5e+00  0e+00  0e+00
## [11] -1e+30 -1e+30  0e+00  0e+00  1e+01 -1e+30  0e+00 -1e+30  2e+01  1e+01
##
## $objtillvalue
##  [1] NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA
```

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

```
## $duals
##  [1]    -0.015     0.000    -0.025    -0.010     1.095     1.110     1.125
##  [8]     1.140     0.000     0.000     0.000     0.000     0.000  9998.905
## [15]     0.000     0.000     0.000  9998.930  9998.915     0.000     0.000
## [22] 99998.915 99998.900  9998.885     0.000     0.015     0.000     0.025
## [29]     0.010
##
## $dualsfrom
##  [1]  2.5e+01  3.5e+01  3.0e+01  1.0e+01  1.0e+01  1.5e+01  2.5e+01  2.0e+01
##  [9] -1.0e+30 -1.0e+30 -1.0e+30 -1.0e+01 -1.0e+30  0.0e+00  0.0e+00 -1.0e+30
## [17] -2.0e+01  0.0e+00  0.0e+00 -1.0e+30 -1.0e+30  0.0e+00  0.0e+00 -1.0e+01
## [25] -1.0e+30 -5.0e+00 -1.0e+30 -5.0e+00 -5.0e+00
##
## $dualstill
##  [1] 2.5e+01 3.5e+01 3.0e+01 1.0e+01 1.0e+01 1.5e+01 2.5e+01 2.0e+01 1.0e+30
## [10] 1.0e+30 1.0e+30 0.0e+00 1.0e+30 5.0e+00 5.0e+00 1.0e+30 5.0e+00 1.0e+01
## [19] 1.0e+01 1.0e+30 1.0e+30 1.0e+01 1.0e+01 1.0e+01 1.0e+30 0.0e+00 1.0e+30
## [28] 2.0e+01 1.0e+01
```