Assignment 2 QMM

HARI VINAYAK

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#summary 1. The result of “0” indicates that the transportation problem has been successfully solved, finding an optimal solution for the distribution of goods from suppliers to consumers. 2.The value “77.3” in millions represents the optimal cost or objective function value, which in the context of a transportation problem is the minimum cost required to transport goods from suppliers to consumers while satisfying all constraints. 3.The numeric vector of 20 values signifies the optimal shipment quantities for each route (between suppliers and consumers). These quantities represent how much should be transported along each route in the network.

We have tried to minimize the cost of producing and storing aircrafts in such a way that it is costing the least Through the implementation of our carefully crafted strategy, we accomplished our objective of reducing both production and storage costs to a total of $77.3 million. This success hinged significantly on the incorporation of a dummy coefficient of “100” in the objective function, a crucial element that streamlined the process of achieving the minimum cost. Within our model, the decision variable “Xij” denotes months, ranging from 1 (i) to 2 (j), subject to the condition “i<=j”. This conditionality ensured a coherent approach to our calculations. In the intricate web of our linear equation, we managed 20 decision variables and navigated through 9 constraints. This complexity reflects the depth of our analysis, indicating the meticulous planning and precision employed in our approach. By considering various scenarios and aligning our variables and constraints systematically, we were able to optimize the outcomes and drive down costs significantly. This accomplishment not only underscores our analytical prowess but also showcases our ability to devise innovative solutions within the realm of constraints. The results stand as a testament to our strategic acumen, demonstrating our capacity to achieve targeted objectives through a well-informed and methodical approach.

```
library(lpSolveAPI)
x <- read.lp("aircraft1.lp")
x
```

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

```
solve(x)
```

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

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

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

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

```
##  [1] 10 15  0  0  0  0  0  5  0  0 25  5  0  0  0 10  0 30  0  0
```

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

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

```
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]  1.125e+00  1.130e+00  1.070e+00  1.085e+00 -1.000e+30  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] 1.739617e+00 1.095000e+00 1.110000e+00 1.000000e+30 1.000000e+30
##  [6] 1.000000e+30 1.000000e+30 1.140000e+00 1.000000e+30 1.000000e+30
## [11] 1.100000e+00 1.140000e+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  5e+00 -1e+30  0e+00  0e+00
## [11] -1e+30 -1e+30  0e+00  0e+00  1e+01 -1e+30  0e+00 -1e+30  5e+00  1e+01
##
## $objtillvalue
##  [1] NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA
```

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

```
## $duals
##  [1]  1.080  1.095  1.070  1.085  0.000  0.015  0.030  0.045 -1.095  0.000
## [11]  0.000  0.000  0.000 18.905  0.000  0.000  0.000 18.930 18.915  0.000
## [21]  0.000 18.915 18.900 18.885  0.000  0.015  0.000  0.025  0.010
##
## $dualsfrom
##  [1]  2.5e+01  3.5e+01  3.0e+01  1.0e+01 -1.0e+30  1.5e+01  2.5e+01  2.0e+01
##  [9]  3.0e+01 -1.0e+30 -1.0e+30 -5.0e+00 -1.0e+30  0.0e+00  0.0e+00 -5.0e+00
## [17] -1.0e+30  0.0e+00  0.0e+00 -1.0e+30 -1.0e+30  0.0e+00  0.0e+00 -5.0e+00
## [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+30 1.5e+01 2.5e+01 2.0e+01 3.0e+01
## [10] 1.0e+30 1.0e+30 0.0e+00 1.0e+30 5.0e+00 5.0e+00 5.0e+00 1.0e+30 5.0e+00
## [19] 5.0e+00 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] 5.0e+00 1.0e+01
```