

QMM -Assignemnt #3

Heart is trying to minimize costs which includes shipping and production costs in both plant A and plant B. However, its supply is more than the demand and hence we need to create a dummy destination, a warehouse in this case to absorb the 10 units demand difference to reach the feasible solution.

Objective function : $\text{Min}(622 x_{11} + 614 x_{12} + 630 x_{13} + 641 x_{21} + 645 x_{22} + 649 x_{23})$

Variables: x_{11} = number of AEDs produced and shipped from plant A to warehouse 1 x_{12} = number of AEDs produced and shipped from plant A to warehouse 2 x_{13} = number of AEDs produced and shipped from plant A to warehouse 3 x_{14} = number of AEDs produced and shipped from plant A to dummy warehouse 4 x_{21} = number of AEDs produced and shipped from plant B to warehouse 1 x_{22} = number of AEDs produced and shipped from plant B to warehouse 2 x_{23} = number of AEDs produced and shipped from plant B to warehouse 3 x_{24} = number of AEDs produced and shipped from plant B to dummy warehouse 4

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

```
## Model name:
##      x11    x12    x13    x21    x22    x23    x14    x24
## Minimize  622    614    630    641    645    649      0      0
## R1         1      1      1      0      0      0      1      0 = 100
## R2         0      0      0      1      1      1      0      1 = 120
## R3         1      0      0      1      0      0      0      0 = 80
## R4         0      1      0      0      1      0      0      0 = 60
## R5         0      0      1      0      0      1      0      0 = 70
## R6         0      0      0      0      0      0      1      1 = 10
## Kind      Std   Std   Std   Std   Std   Std   Std   Std
## Type      Real  Real  Real  Real  Real  Real  Real  Real
## Upper     Inf   Inf   Inf   Inf   Inf   Inf   Inf   Inf
## Lower      0     0     0     0     0     0     0     0
```

Constraints: Plant A capacity constraint: $x_{11} + x_{12} + x_{13} + x_{14} = 100$, Plant B capacity constraint: $x_{21} + x_{22} + x_{23} + x_{24} = 120$, Warehouse 1 Demand constraint: $x_{11} + x_{21} = 80$, Warehouse 2 Demand Constraint: $x_{12} + x_{22} = 60$, Warehouse 3 Demand constraint: $x_{13} + x_{23} = 70$, Warehouse 4 Demand constraint: $x_{14} + x_{24} = 10$

```
solve(x)
```

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

```
get.objective(x)    #Total costs of shipping and production = $132790
```

```
## [1] 132790
```

```
get.variables(x)    #x11= 0, x12=60, x13=40 , x21= 80, x22= 0, x23= 30, x14, 0, x24 =10, total AEDs to b  
  
## [1]  0 60 40 80  0 30  0 10
```