vkatta_4

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1. Heart Start AEDs

Reading LP file

```
library(lpSolve)
library(lpSolveAPI)
lprec <- read.lp("vkatta_4.lp")
```

Solving the LP problem using the Solve() function

```
solve(lprec)
```

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

```
get.objective(lprec)
```

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

```
get.variables(lprec)
```

```
## [1]  0 60 40 80  0 30
```

```
get.constraints(lprec)
```

```
## [1] 100 110  80  60  70
```

Arranging the solution of the LP problem with variables against values

```
ColNames <- c("AW1", "AW2", "AW3", "BW1", "BW2", "BW3")
solution <- data.frame(ColNames, get.variables(lprec)) # Solution of the problem
colnames(solution) <- c("variable", "value")
solution
```

```
##   variable value
## 1      AW1     0
## 2      AW2    60
## 3      AW3    40
## 4      BW1    80
## 5      BW2     0
## 6      BW3    30
```

Hence, Plant A is to produce 100 units and ship 60 units to Warehouse2 and 40 units to Warehouse3

Plant B is to produce 110 units and ship 80 units to Warehouse1 and 30 units to Warehouse3

2. Texxon Oil Distribution

1) Minimum Cost of providing oil to refineries

Given,

Capacity of wells W1, W2 and W3 are 93, 88 and 95 respectively

Requirements of refineries R1, R2, R3, R4, R5 are 30, 57, 48, 91 and 48 respectively

Let,

```
Xij be the flow of oil from well i to Pump j
where, i= W1, W2, W3 and j= A, B, C

Yij be the flow of oil from Pump i to Refinery j
where, i= A, B, C and j= R1, R2, R3, R4, R5
```

Charges levied on pipeline usage are as follows:

AW1 - Well1 to PumpA = 1.52
AW2 - Well2 to PumpA = 1.70
AW3 - Well3 to PumpA = 1.45
BW1 - Well1 to PumpB = 1.60
BW2 - Well2 to PumpB = 1.63
BW3 - Well3 to PumpB = 1.57
CW1 - Well1 to PumpC = 1.40
CW2 - Well2 to PumpC = 1.55
CW3 - Well3 to PumpC = 1.30
AR1 - PumpA to Refinery1 = 5.15
BR1 - PumpB to Refinery1 = 5.12
CR1 - PumpB to Refinery1 = 5.32
AR2 - PumpA to Refinery2 = 5.69
BR2 - PumpB to Refinery2 = 5.47
CR2 - PumpC to Refinery2 = 6.16

AR3 - PumpA to Refinery3 = 6.13
BR3 - PumpB to Refinery3 = 6.05
CR3 - PumpC to Refinery3 = 6.25
AR4 - PumpA to Refinery4 = 5.63
BR4 - PumpB to Refinery4 = 6.12
CR4 - PumpC to Refinery4 = 6.17
AR5 - PumpA to Refinery5 = 5.80
BR5 - PumpB to Refinery5 = 5.71
CR5 - PumpC to Refinery5 = 5.87

Here, the minimum cost function is:

Min : 1.52AW1+ 1.70AW2+ 1.45AW3+ 1.60BW1+ 1.63BW2+ 1.57BW3+ 1.40CW1+ 1.55CW2+ 1.30CW3+ 5.15AR1+ 5.12BR1+ 5.32CR1+ 5.69AR2+ 5.47BR2+ 6.16CR2+ 6.13AR3+ 6.05BR3+ 6.25CR3+ 5.63AR4+ 6.12BR4+ 6.17CR4+ 5.80AR5+ 5.71BR5+ 5.87CR5

Where,

AW1 + BW1 + CW1 <= 93
AW2 + BW2 + CW2 <= 88
AW3 + BW3 + CW3 <= 95
AR1 + BR1 + CR1 = 30
AR2 + BR2 + CR2 = 57
AR3 + BR3 + CR3 = 48
AR4 + BR4 + CR4 = 91
AR5 + BR5 + CR5 = 48

Here, wells 1 and 3 are used to their capacity