1.

Trans.lp

/* Objective function */

min: 600 W11 + 600 W12 + 600 W13 + 625 W21 + 625 W22 + 625 W23 + 22 W12 + 14 W12 + 30 W13 + 16 W21 +20 W22 + 24 W23 ;

/* Demand Constraints */

W11 + W21 >= 80;

W12 + W22 >= 60;

W13 + W23 >= 70;

/* Production Constraints */

W11 + W12 + W13 <= 100;

W21 + W22 + W23 <= 120;

.Rmd

Untitled

Load the Constraint data

```
#install.packages("lpSolveAPI")
library(lpSolveAPI)
lprec <- read.lp("Trans.lp")
```

Build and Solve the model

The solution implies that the minimum optimum cost is 131750 and warehouse 1 , warehouse 3 should be shipped 80 and 20 units respectively from Plant 1. Similarly , 60 and 50 units to warehouse 2 and 3 respectively from Plant 2 (We will be producing 10 units lessthan the capacity).

```
solve(lprec)

## [1] 0

get.objective(lprec)

## [1] 131750

get.variables(lprec)

## [1] 80  0 20  0 60 50

get.constraints(lprec)

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

2.

i.) Formulation

From the given info we see that total supply is 276 **(**93+88+95), whereas, the demand is 284 (30+57+48+91+58). That means company cant meet the demand with the existing setup.

Wij >= 0: where i = A, B, C for pumps, j= 1,2,3 for wells, and R1 to 5 are refineries

Zmin = 1.52 W1A + 1.60 W1B + 1.40 W1C + 1.70 W2A + 1.63 W2B + 1.55 W2C + 1.45 W3A + 1.57 W3B + 1.30 W3C + 5.15 WAR1 + 5.12 WBR1 + 5.32 WCR1 + 5.69 WAR2 + 5.47 WBR2 + 6.16 WCR2 +6.13 WAR3 + 6.05 WBR3 + 6.25 WCR3 + 5.63 WAR4 + 6.12 WBR4 + 6.17 WCR4 + 5.80 WAR5 + 5.71 WBR5 +5.87 WCR5

Constraints (Supply)

W1A +W1B + W1C <= 93
W2A + W2B + W2C <= 88
W3A + W3B + W3C <= 95

Constraints (Pumps to Refinery)

W1A + W2A + W3A = WAR1 + WAR2 + WAR3 + WAR4 + WAR5
W1B + W2B + W3B = WBR1 + WBR2 + WBR3 + WBR4 + WBR5
W1C + W2C + W3C = WCR1 + WCR2 + WCR3+ WCR4 + WCR5

Constraints (Demand)

WAR1 + WBR1 + WCR1 = 30
WAR2 + WBR2 + WCR2 = 57
WAR3 + WBR3 + WCR3 = 48
WAR4 + WBR4 + WCR4 = 91
WAR5 + WBR5 + WCR5 = 48

ii.) Network Diagram

W stands for well P for Pump and R for refinery