

The variables:

The number of products of each specific type to manufacture, x_{ijklm} , where:

- $i = 1$ or 2 , representing the product, 1 or 2
- $j = F$ or M , representing the month, February or March
- $k = E$ or W , representing the manufacturing plant, East or West
- $l = 1$ or 2 , representing the manufacturing process, 1 or 2
- $m = E$ or W , representing the region the product is sold in, East or West

The number of products made in February that should be stored until March, s_{ik} , where:

- $i = 1$ or 2 , representing the product, 1 or 2
- $k = E$ or W , representing the manufacturing plant, East or West

Objective:

Maximize profit (\$): $Z =$

$$\begin{aligned} & 62(x_{1FE1E} + x_{1FE1W} + x_{1ME1E} + x_{1ME1W}) + \\ & 59(x_{1FE2E} + x_{1FE2W} + x_{1ME2E} + x_{1ME2W}) + \\ & 61(x_{1FW1E} + x_{1FW1W} + x_{1MW1E} + x_{1MW1W}) + \\ & 65(x_{1FW2E} + x_{1FW2W} + x_{1MW2E} + x_{1MW2W}) + \\ & 78(x_{2FE1E} + x_{2FE1W} + x_{2ME1E} + x_{2ME1W}) + \\ & 85(x_{2FE2E} + x_{2FE2W} + x_{2ME2E} + x_{2ME2W}) + \\ & 89(x_{2FW1E} + x_{2FW1W} + x_{2MW1E} + x_{2MW1W}) + \\ & 86(x_{2FW2E} + x_{2FW2W} + x_{2MW2E} + x_{2MW2W}) \\ & - 3(s_{1E} + s_{1W}) - 4(s_{2E} + s_{2W}) \end{aligned}$$

Constraints:

Demand:

- February demand for product 1 in the east ≤ 3600 : e.g.,

$$x_{1FE1E} + x_{1FE2E} + x_{1FW1E} + x_{1FW2E} - s_{1E} \leq 3600$$

- February demand for product 1 in the west ≤ 4900
- February demand for product 2 in the east ≤ 4500
- February demand for product 2 in the west ≤ 5100
- March demand for product 1 in the east ≤ 6300
- March demand for product 1 in the west ≤ 4200
- March demand for product 2 in the east ≤ 5400
- March demand for product 2 in the west ≤ 6000

Storage Limits:

- Storage limit in the eastern plant ≤ 1000 , e.g.,

$$s_{1E} + s_{2E} \leq 1000$$

- Storage limit in the western plant ≤ 1000

Production Day Capacity Limits:

- February process 1 days in the east for products 1 and 2 ≤ 20 , e.g.,

$$1/100(x_{1FE1E} + x_{1FE1W}) + 1/120(x_{2FE1E} + x_{2FE1W}) \leq 20$$

- February process 2 days in the east for products 1 and 2 ≤ 20
- February process 1 days in the west for products 1 and 2 ≤ 20
- February process 2 days in the west for products 1 and 2 ≤ 20
- March process 1 days in the east for products 1 and 2 ≤ 23
- March process 2 days in the east for products 1 and 2 ≤ 23
- March process 1 days in the west for products 1 and 2 ≤ 23
- March process 2 days in the west for products 1 and 2 ≤ 23

Items that are stored must have been made:

- East product 1 stored in February must be made (All eastern made product 1 manufactured must be \geq product 1 made in the east and stored), e.g.,

$$x_{1FE1E} + x_{1FE1W} + x_{1FE2E} + x_{1FE2W} - s_{1E} \geq 0$$

- East product 2 stored in February must be made
- West product 1 stored in February must be made
- West product 2 stored in February must be made