**Transportation Problem**

Frida’s Imports has merchandise at three warehouses in different cities. Each month, Frida must ship merchandise to four customers in different cities.

**Warehouses:**

Albuquerque has 100,000 units each month

Chicago has 200,000 units each month

Atlanta has 250,000 units each month

**Customers:**

San Francisco needs at least 100,000 units each month

Seattle needs at least 100,000 units each month

Boston needs at least 200,000 units each month

Omaha needs at least 100,000 units each month

Shipping cost per unit is given here:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | To | | | | |
| From |  | SanF | Seattle | Boston | Omaha |
| Alb | $3 | $5 | $9 | $5 |
| Chi | $5 | $6 | $7 | $2 |
| Atl | $6 | $8 | $6 | $4 |

Formulate a linear programming problem to help Frida decide how to supply her customers at minimal total shipping cost.

**Transshipment problem**

Modify Frida’s situation: Frida has no stock in the warehouses. However, all stock must pass through one of the warehouses before being shipped to a customer as that is where quality control is handled. She has 3 production plants with production capacities given below:

Phoenix: 120,000 units per month

South Bend: 180,000 units per month

Memphis: 220,000 units per month

Unit shipping costs from the production plants to the warehouses are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | To | | | |
| From |  | Albuquerque | Chicago | Atlanta |
| Phoenix | $2 | $4 | $7 |
| South Bend | $4 | $3 | $5 |
| Memphis | $5 | $6 | $2 |

Formulate a linear programming problem to help Frida decide how much to produce at each plant and how to ship the products from plants to warehouses to customers so as to minimize total shipping costs.

**Transshipment problem #2**

* Consolidated Distribution Company has 2 factories which produce a product which must then be shipped to its 2 warehouses
* Factory 1 produces 80 truckloads of the product per week.
* Factory 2 produces 70 truckloads per week.
* Warehouse 1 needs 60 truckloads per week.
* Warehouse 2 needs 90 truckloads per week.
* Shipping can be directly from factory to warehouse, or can be via a Distribution Center.
* This figure illustrates the shipping network with cost per unit (i.e. truckload) and shipping capacities.
* What is the least costly way to ship the product?

