MAT540

Week 10 Homework

Chapter 6

1. Consider the following transportation problem:

| From | To (Cost) | | | Supply |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| A | 6 | 5 | 5 | 150 |
| B | 11 | 8 | 9 | 85 |
| C | 4 | 10 | 7 | 125 |
| Demand | 70 | 100 | 80 | |

Formulate this problem as a linear programming model and solve it by the using the computer.

2. Consider the following transportation problem:

| From | To (Cost) | | | Supply |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| A | 8 | 14 | 8 | 120 |
| B | 6 | 17 | 7 | 80 |
| C | 9 | 24 | 10 | 150 |
| Demand | 110 | 140 | 100 | |

Solve it by using the computer.

3. World foods, Inc. imports food products such as meats, cheeses, and pastries to the United States from warehouses at ports in Hamburg, Marseilles and Liverpool. Ships from these ports deliver the products to Norfolk, New York and Savannah, where they are stored in company warehouses before being shipped to distribution centers in Dallas, St. Louis and Chicago. The products are then distributed to specialty foods stores and sold through catalogs. The shipping costs ($/1,000 lb.) from the European ports to the U.S. cities and the available supplies (1000 lb.) at the European ports are provided in the following table:

| From | To (Cost) | | | Supply |
|---|---|---|---|---|
| | 4. Norfolk | 5. New York | 6. Savannah | |
| 1. Hamburg | 320 | 280 | 555 | 75 |
| 2. Marseilles | 410 | 470 | 365 | 85 |
| 3. Liverpool | 550 | 355 | 525 | 40 |

The transportation costs ($/1000 lb.) from each U.S. city of the three distribution centers and the demands (1000 lb.) at the distribution centers are as follows:

| Warehouse | Distribution Center | | |
|---|---|---|---|
| | 7. Dallas | 8. St. Louis | 9. Chicago |
| 4. Norfolk | 80 | 78 | 85 |
| 5. New York | 100 | 120 | 95 |
| 6. Savannah | 65 | 75 | 90 |
| Demand | 85 | 70 | 65 |

Determine the optimal shipments between the European ports and the warehouses and the distribution centers to minimize total transportation costs.

4. The Omega Pharmaceutical firm has five salespersons, whom the firm wants to assign to five sales regions. Given their various previous contacts, the sales persons are able to cover the regions in different amounts of time. The amount of time (days) required by each salesperson to cover each city is shown in the following table:

| Salesperson | Region (days) | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| 1 | 20 | 10 | 12 | 10 | 22 |
| 2 | 14 | 10 | 18 | 11 | 15 |
| 3 | 12 | 13 | 19 | 11 | 14 |
| 4 | 16 | 12 | 14 | 22 | 16 |
| 5 | 12 | 15 | 19 | 26 | 23 |

Which salesperson should be assigned to each region to minimize total time? Identify the optimal assignments and compute total minimum time.