



***Solve the Following Problems***

**Problem # 1 (10 Points)**

Formulate the linear programming model for the following problem.

Better Products, Inc. is a small manufacturer of three products. The products are produced on two machines. In a typical week 40 hours of time are available on each machine. Profit contribution and production time in hours per unit are as follows:

|                     | Product 1 | Product 2 | Product 3 |
|---------------------|-----------|-----------|-----------|
| Profit/unit         | \$30      | \$50      | \$20      |
| Machine 1 time/unit | 0.5       | 2.0       | 0.75      |
| Machine 2 time/unit | 1.0       | 1.0       | 0.5       |

Two operators are required for machine 1. Thus 2 hours of labor must be scheduled for each hour of machine 1 time. Only one operator is required for machine 2. A maximum of 100 labor hours is available for assignment to the machines during the coming week. Other production requirements are that product 1 cannot account for more than 50% of the units produced and that product 3 must account for at least 20% of the units produced.

**Problem # 2 (20 Points)**

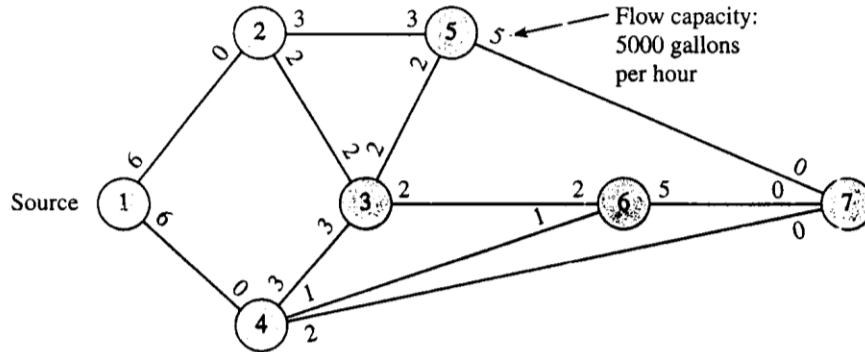
A firm that specializes in nonferrous casting must decide between locating a new foundry in Arar or Sakaka. Transportation costs from each proposed location to existing warehouses are shown in the following table, along with transportation costs for existing locations for a certain type of casting. Each will be able to supply 2,500 units per month. Which location should be chosen on a transportation cost basis?

| Sakaka | Cost per unit | Arar | Cost per unit |
|--------|---------------|------|---------------|
| A      | \$ 10         | A    | \$ 12         |
| B      | 8             | B    | 13            |
| C      | 15            | C    | 5             |

|  |   | Warehouse |    |    | Supply<br>(hundreds of<br>units/month) |
|--|---|-----------|----|----|--|
|  |   | A         | B  | C  |  |
| From:                                  | 1 | 17        | 10 | 6  | 30                                     |
|  | 2 | 7         | 12 | 14 | 20                                     |
| Demand<br>(hundreds of<br>units/month) |   | 25        | 10 | 40 |  |

**Problem # 3 (20 Points)**

The Misr Oil Company owns a pipeline network that is used to convey oil from its source to several storage locations. A portion of the network is as follows:



Due to the varying pipe sizes, the flow capacities also vary. By selectively opening and closing sections of the pipeline network, the firm can supply any of the storage locations.

If the firm wants to supply storage location 7 and fully utilize the system capacity, how long will it take to satisfy a location 7 demand of 100,000 gallons? What is the maximal flow for this pipeline system?



تمنياتي للجميع بالنجاح

