

Assignment 3

1.

A hospital outpatient clinic performs four types of operations. The profit per operation, as well as the minutes of X-ray time and laboratory time used are given in Table

The clinic has 500 private rooms and 500 intensive care rooms. Type 1 and Type 2 operations require a patient to stay in an intensive care room for one day while Type 3 and Type 4 operations require a patient to stay in a private room for one day. Each day the hospital is required to perform at least 100 operations of each type. The hospital has set the following goals:

Goal 1 Earn a daily profit of at least \$100,000.

Goal 2 Use at most 50 hours daily of X-ray time.

Goal 3 Use at most 40 hours daily of laboratory time.

The cost per unit deviation from each goal is as follows:

Goal 1 Cost of \$1 for each dollar by which profit goal is unmet

Goal 2 Cost of \$10 for each hour by which X-ray goal is unmet

Goal 3 Cost of \$8 for each hour by which laboratory goal is unmet

Formulate a goal programming model to minimize the daily cost incurred due to failing to meet the hospital's goals.

TABLE

	Type of Operation			
	1	2	3	4
Profit (\$)	200	150	100	80
X-ray time (minutes)	6	5	4	3
Laboratory time (minutes)	5	4	3	2

2.

Televeno produces TV picture tubes at three plants. Plant 1 can produce 50 tubes per week; plant 2, 100 tubes per week; and plant 3, 50 tubes per week. Tubes are shipped to three customers. The profit earned per tube depends on the site where the tube was produced and on the customer who purchases the tube (see Table 1). Customer 1 is willing to purchase as many as 80 tubes per week; customer 2, as many as 90; and customer 3, as many as 100. Televeno wants to find a shipping and production plan that will maximize profits.

- a** Formulate a balanced transportation problem that can be used to maximize Televeno's profits.
- b** Use the northwest corner method to find a bfs to the problem.
- c** Use the transportation simplex to find an optimal solution to the problem.

TABLE 1

From	To (\$)		
	Customer 1	Customer 2	Customer 3
Plant 1	75	60	69
Plant 2	79	73	68
Plant 3	85	76	70