OR Transportation Project
Due Dec. Thurs. Dec 9. (25 pts)

Due to your quality of work on the last project, you have been reassigned to work for Dole. This time you are to help them with their transportation of goods. Regardless of the product shipped, the cost is the same per pound and Dole ships 100,000,000 pounds of pineapple a year.

Currently Dole has 3 distribution centers located California, Texas and North Carolina. The cost to ship 1000 lbs from Hawaii to these three centers is given in Table 1. Furthermore, the amount of pounds that each center can handle is also given in Table 1. Finally, the fixed charge for using any distribution center is also given in Table 1.

The customers have been geographically grouped into 4 regions and the average transportation cost of 1000 pounds of pineapple products from any of the distribution centers to these four regions is given in Table 2. The demand of each of these regions is also given in Table 2. Dole's current shipping policy costs approximately $46,000,000 per year.

On Thursday Dec 9, hand in your spreadsheet. There is no set length to the Technical Report, but this report should convince the engineer that you are competent and your solution is correct.

Table 1 Distribution Centers	Transportation cost per 1000 LBS	Capacity	Fixed Operating Charge
California	200	80000000	100000
Texas	300	50000000	70000
North Carolina	300	60000000	80000

Table 2	Tranporation costs distribution centers to customers			
	Eastern Cust	Southern Cust	Midwestern Cust	Western Cust
California	300	250	200	100
Texas	250	150	150	250
North Carolina	150	150	200	300
Pineapple lbs. demanded	35000000	30000000	15000000	20000000

TABLE 37

Size Group Requested (Seats)	Hours Requested	Number of Requests
50	2, 3, 4	3
150	1, 2, 3	1
100	5	1
50	1, 2	2

TABLE 38

Size Requested	Size Assigned: 50 Seats	100 Seats	150 Seats
50	0	2	4
100	X	0	1
150	X	X	0

100* (Hours requested)
100* (Hours requested)
100* (Hours requested)

37 The Indiana University Business School has two rooms that each seat 50 students, one room that seats 100 students, and one room that seats 150 students. Classes are held five hours a day. The four types of requests for rooms are listed in Table 37. The business school must decide how many requests of each type should be assigned to each type of room. Penalties for each type of assignment are given in Table 38. An X means that a request must be satisfied by a room of adequate size. Formulate an IP whose solution will tell the business school how to assign classes to rooms in a way that minimizes total penalties.

§Based on Salkin (1979).

TABLE 23

1	80	34
2	60	44
3	40	44
4	20	24
5	40	114
6	40	64
7	70	14
8	50	44
9	70	54
10	70	64

25† Governor Blue of the state of Berry is attempting to get the state legislature to gerrymander Berry's congressional districts. The state consists of 10 cities, and the numbers of registered Republicans and Democrats (in thousands) in each city are shown in Table 23. Berry has five congressional representatives. To form congressional districts, cities must be grouped according to the following restrictions:

1 All voters in a city must be in the same district.

2 Each district must contain between 150,000 and 250,000 voters (there are no independent voters).

Governor Blue is a Democrat. Assume that each voter always votes a straight party ticket. Formulate an IP to help Governor Blue maximize the number of Democrats who will win congressional seats.

†Based on Garfinkel and Nemhauser (1970).
‡Based on Gelb and Khumawala (1984).