IE 303.3 Modeling and Methods in Optimization
Fall 2004
HW # 3, Due: 18.10.2004

The homework is expected to be strictly personal work. If you happen to find answers to any questions in a book or on the web, please give proper reference. Failure to do so will result in zero credit.

1[50 points] An airline company can buy gasoline from three suppliers. The suppliers have available 2000, 6000, and 6000 gallons, respectively. The company needs gasoline at three locations with each location requiring 5000, 3000, and 2000 gallons' respectively. The per/1000 gallon quoted price for gas delivered to each location is as follows: from supplier 1 to location 1 2, from supplier 1 to location 2 1, from supplier 1 to location 3 1, from supplier 2 to location 1 4, from supplier 2 location 2 2, from supplier 2 to location 3 5, from supplier 3 to location 1 1, from supplier 3 to location 2 8, from supplier 3 to location 3 9. How can the company buy gasoline to minimize the total cost? Formulate the problem as one of the network optimization models discussed in class, and solve it using XPRESS-MP/MOSEL.

2[50 points] A company has contracted for five jobs. These jobs can be performed in six of its manufacturing plants. Because of the size of the jobs, it is not feasible to assign more than one job to a particular manufacturitng facility. Also, the second job cannot be assigned to the third manufacturing plant. The cost estimates in thousands of dollars, of performing the jobs in different manufacturing plants are summarized below:

JOB	PLANT					
1	50	55	42	57	48	52
2	66	70	-	68	75	63
3	81	78	72	80	85	78
4	40	42	38	45	46	42
5	62	55	58	60	56	65

Formulate the problem of assigning the jobs to the plants at minimal total cost as one of the network optimization models discussed in class, and solve it using XPRESS-MP/MOSEL.

3[Extra credit] Can you prove the max flow-min cut theorem departing from the LP formulation of the maximum flow problem, taking the dual of this problem, and using the strong duality and complementary slackness properties of LP duality theory?