IE 303.3 Modeling and Methods in Optimization
Fall 2004
HW # 4, Due: 25.10.2004

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] A cyclist in city A wants to reach city F using the road network connecting city A to city F. The distance from city A to city B is 2 kilometers, while the distances from city A to cities C and D are 2 and 3 km, respectively. From city B, he can directly go to city E pedalling for 5 kilometers. From city C he can go to city B in 4 kilometers, to city E in 3 kilometers, and to city F in 6 kilometers. From city D he could cycle for 1 kilometer and reach city C, or reach city E directly after cycling for 1 km. From city D, he could directly cycle to city F as well for 3 kilometers, or pass to to city B in 2 kilometers, and cycle to city F in 2 kilometers. Find the shortest route for this cyclist using two different methods discussed in class, without using integer programming. Use XPRESS-MP/MOSEL in your answer whenever needed.

2[50 points] A telephone company wishes to connect 8 customer locations using the smallest possible amount of wiring. The cost of connecting every pair of locations is summarized in the table below:

Location	Location							
	1	2	3	4	5	6	7	8
1	-	4	9	11	M	7	M	M
2		-	2	M	3	M	6	7
3			-	M	M	1	6	M
4				-	M	M	12	8
5					-	3	8	6
6						-	M	7
7							-	5
8								-

The technologically impossible connections are represented by a "big M" in the cost table. Find the least costly wiring scheme for the company using two different methods discussed in class without using integer programming. Use XPRESS-MP/MOSEL in your answer whenever needed.