Institut for Matematik & Datalogi
Syddansk Universitet

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JBJ

DM85 Networks and Integer Programming — Ugeseddel 8

No Classes in week 13 Instead you were supposed to read Chapter 5 of Papadimitriou (handed out earlier) carefully, including the description of the primal-dual algorithm for the shortest path problem. We will not discuss that at the lectures, so it is your own resonsibility to read this. You should also read Chapters 5 and 7 of LW. Most of this is known from other courses.

Lecture April 2, 2007: I will hand back the first projects. If my voice allows it we will speak about Branch and cut for TSP.

Lecture April 10, 2007 12-14 in the seminarroom Branch and Cut. LW Chapter 9.5 and 9.6. I will also discuss the OPL script for minimum spanning trees.

Exercises for April 16, 2007: LW Chapter 8: 8.5, 8.8, 8.15.

Week 15 Here we will have a Lecture on April 10 12-14 in the seminarroom. There will be no lecture on April 13 as I will be away. Instead you should work with OPL script and construct an OPL script for the minimum spanning tree problem. You should use the orientation version which I described at earlier and again at the lecture on April 10 (The observation is that any spanning tree T can be oriented as follows : fix a vertex, say 1 and orient T so that there is a directed path from 1 to every other vertex. Call the orinted tree H and note that in H every vertex except 1 has indegree precisely 1. This means that in the model belonging to the script you can use that the sum of x_{ij} over i (all edges into j) is 1 for every $j \neq 1$.). Try also to implement the flow version that I mentioned: This is a fixed charge network flow problem. Use variables y_{ij} to indicate whether an edge is used and use these variables to calculate the objective value. Use another set of variables on the directed version of G (an edge ij is replaced by the arcs $i \to j$ and $j \to i$). The x variables should model that there is a flow of value 1 from a fixed vertex, say the vertex 1 to every other vertex. In terms of balance vectors this is equivalent to saying that the balance of every vertex except 1 is -1 and the balance of 1 is $n-1$. Finally you must relate the x and y variables (cannot send flow on an arc if the corresponding edge is not taken).

Compare the results of the flow model solutions to the cutting plane algorithm for MST (the OPL script above) and see which is the fastest (you may have to use the full version of OPL studio, so please remember to use it only when you make the calculations!).