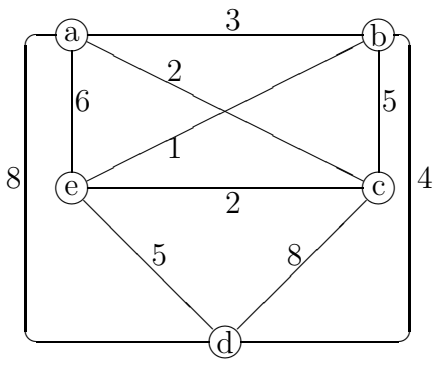
T-79.4201 **Autumn 2007**
Search Problems and Algorithms
Tutorial 3, 4 October
Problems

1. Draw the search space corresponding to the 3-SAT formula

   $$(x_1 \vee x_2 \vee x_3) \wedge (\bar{x}_1 \vee x_2 \vee x_3) \wedge (x_1 \vee \bar{x}_2 \vee x_3) \wedge (x_1 \vee x_2 \vee \bar{x}_3) \wedge (\bar{x}_1 \vee \bar{x}_2 \vee x_3)$$

   as a cube, and mark down at the corners of this cube the values of the objective function indicating the number of unsatisfied clauses at each point (= truth assignment).

2. Determine an optimal TSP route for the problem instance given below, using the Branch and Bound method discussed at the lectures.



3. Design a Branch and Bound method for solving the MAX CUT optimisation problem discussed in Problem 4 of last week's tutorial. Indicate in particular what is your notion of a partial solution, and what upper bounding heuristic you are using to prune the search. Present a small example of how your method works.

4. Consider the relationship between branch-and-bound optimisation and the A* algorithm. Reformulate the branch-and-bound approach to solving the TSP problem discussed at last week's lecture as an A* graph search. What are the nodes, edges and edge costs of the search graph? What are the functions f, g and h used in the A* algorithm in this case?