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

\[(x_1 \lor x_2 \lor x_3) \land (\bar{x}_1 \lor x_2 \lor x_3) \land (x_1 \lor \bar{x}_2 \lor x_3) \land (x_1 \lor x_2 \lor \bar{x}_3) \land (\bar{x}_1 \lor \bar{x}_2 \lor x_3)\]

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.

![TSP Graph](image)

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?