1. (20 pts) On logic inference rules:
   (a) There are several logic inference rules, including resolution. For what kind of knowledge representation would you prefer resolution over the other rules?
   (b) Convert the following into clauses suitable for resolution:
      i. $\exists x\, \text{TeachesAt}(x, \text{FIT}) \land \text{TeachesSubject}(x, \text{CS})$
      ii. $\forall x \, \exists y \, \text{Student}(x) \Rightarrow \text{Teaches}(y, x)$

2. (25 pts) What are the properties for a heuristic in A*? Explain a generic mechanism for building an A* heuristic for a new problem. Show how that mechanism can be used to provide an A* heuristic for solving the traveling salesman problem (find the shortest cycle that visits all nodes in a graph).

3. (25 pts) On Constraint Satisfaction Problems (CSPs):
   (a) What is a CSP?
   (b) Model the following problem as a CSP: Consider a tournament with five teams. Each pair of the five teams has to play each other within a one-week period. There are two available stadiums and two games can be held in each of them every day. A team cannot play more than twice in any three consecutive days.

4. (30 pts) Consider a tic-tac-toe game with players A and B:
   (a) Define an evaluation function that scores a board state.
   (b) Build a minimax game tree with 2 plys (levels) from Player A’s perspective (symmetric board states need not be included).
   (c) Use the evaluation function to score all leaf nodes in the game tree.
   (d) Apply alpha-beta pruning to the game tree, indicate nodes (if any) that are pruned, show the score at the root, and state the best move Player A should take.