1. Explain briefly how the local search technique Stochastic Beam Search works. [4]

2. Explain briefly how the local search technique Simulated Annealing works. [5]

3. One problem in adversarial search is the “horizon effect” and a possible solution is the use of “singular extensions”.
   (a) Explain briefly what the “horizon effect” is. [3]
   (b) Explain briefly what “singular extensions” are. [3]

4. Explain briefly the concept behind ProbCut. [5]

5. Explain briefly how Particle Swarm Optimization works. [5]

6. Assuming a bound of [-10,10] on the state eval values, calculate the bound on node C after evaluating nodes D1 and D2. Show all your calculations for full points! [10]

The final questions are about the following adversarial search tree. State evaluation heuristic values for the max player are provided in the form of numbers following the letter labels of the states (e.g., A29 indicates that the heuristic value of state A for the max player is 29). The order in which successors are generated is from left to right. Example: A generates first B, then C, and finally D. Non-quiescent states are indicated by bold circled states.

7. Give the execution trace for HTQSABIDM(A,3,2,−∞,∞). [45]

8. Indicate for each depth iteration of HTQSABIDM(A,3,2,−∞,∞) which nodes, if any, get pruned. [7]

9. What is the Principal Variant (PV) found by HTQSABIDM(A,3,2,−∞,∞)? [3]