1. Using the corresponding letter labels, provide separate classifications of the Backgammon task environment according to the following class types and for each classification include a brief explanation:
   (a) Fully observable/partially observable [2]
   (b) Single agent/multiagent [2]
   (c) Deterministic/stochastic [2]
   (d) Episodic/sequential [2]
   (e) Static/dynamic/semi-dynamic [2]
   (f) Discrete/continuous [2]
   (g) Known/unknown [2]

2. Given two admissible heuristics $h_1$ and $h_2$.
   (a) What does it mean for $h_1$ to dominate $h_2$? [2]
   (b) If $h_1$ dominates $h_2$, what is the implication for $A^*TS$ using $h_1$ versus $A^*TS$ using $h_2$? [2]
   (c) Are there any circumstances under which it would be beneficial to include in the max composite heuristic, two heuristics of which one is dominated by the other? Explain your answer! [2]

The next three questions are about the following adversarial “chance” tree.

3. Calculate the EXPECTIMINIMAX values for nodes B, C and D in the above adversarial “chance” tree. Show your calculations! [3]

4. Which action will MAX choose, $a_1$, $a_2$, or $a_3$? Explain your answer! [2]

5. If the utility values given for MIN were multiplied with a positive constant $c$, which action would MAX then choose? Explain your answer! [2]
Questions 6-10 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., A7 indicates that the state evaluation heuristic value of state A for the max player is 7). The order in which successors are generated is from left to right. Example: A generates first B, then C, and finally D.

6. Give the execution trace for ABIDM(A,3,
\(-\infty, \infty\)) [ABIDM = Iterative-Deepening Depth-Limited Minimax with Alpha-Beta Pruning]. [25]

7. Indicate for each depth iteration of ABIDM(A,3,
\(-\infty, \infty\)) which nodes, if any, get pruned. [5]

8. What is the Principal Variant (PV) found by ABIDM(A,3,
\(-\infty, \infty\))? [3]

9. Would IDM(A,3) have found the same PV? Explain your answer! [2]

10. Would adding a move ordering heuristic to ABIDM possibly have changed the PV found? Explain your answer! [2]