CS347 FS2003 Exam 3

This is a closed-book exam. The only item not supplied that you are allowed (and required) to use, is a pen or pencil. Mark all paper you use with your name, the date, and the string “cs347fs2003 exam3”. If you are caught cheating, you will receive a zero grade for this exam. The max number of points per question is indicated in square brackets after each question. The sum of the max points is 100. You have exactly 50 minutes to complete this exam. Good luck!

All the questions on this page 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., B3 indicates that the heuristic value of state B is 3). The order in which successors are generated is from left to right. Example: A generates first B and then C. The non-quiescent states are circled in bold; assume that all moves from these states are a threat or counter a threat (which implies that they need to be explored).

1. What is the advantage of adding alpha-beta pruning to a minimax algorithm? [4]

2. Give two advantages of Iterative Deepening minimax algorithms over Depth Limited minimax algorithms. [8]

3. Explain what a transposition table is and what its use is in adversarial search. [8]

4. Give the execution trace of Depth Limited Minimax employing Alpha-Beta pruning with depth-limit=2 and root-node=A and Quiescence Search with QSdepth-limit=1 (QSABDLM(A,2,1,−∞,∞)). [20]

5. What is the Principal Variant (PV) found by QSABDLM(A,2,1,−∞,∞)? [5]

6. Give the execution trace of Iterative Deepening Minimax employing Alpha-Beta pruning with depth-limit=2 and root-node=A and History Table Move Ordering Heuristic and Quiescence Search with QSdepth-limit=1 (QSHTABIDM(A,2,1,−∞,∞)). [25]

7. What is the PV found by QSHTABIDM(A,2,1,−∞,∞)? [5]

8. From ALL the information available to you in the adversarial search tree, did having the Quiescence Search in the above traces you executed improve the search results? [5]
The final three questions are about the following adversarial “chance” tree.

9. Calculate the EXPECTIMINIMAX values for nodes B, C and D in the above adversarial “chance” tree. Show your calculations! [9]

10. Which action will MAX choose, $a_1$, $a_2$, or $a_3$? Explain your answer! [5]

11. If the utility values given for MIN were multiplied with a positive constant $c$, which action would MAX then choose? [6]