18/20

Comp3620/Comp6320 Artificial Intelligence

Quiz 1: Search

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1. **Combining Heuristics**

   True or False: (1pt per correct answer)

   Let h_1 and h_2 be two **admissible** heuristics:

   - (True) or False: $\min(h_1, h_2)$ is necessarily admissible
   - (True) or False: $\max(h_1, h_2)$ is necessarily admissible
   - (True) or False: $\min(2h_1, h_2)$ is necessarily admissible
   - (True) or False: $(2h_1 + h_2)/3$ is necessarily admissible
   - True or (False) $\min(h_1, h_2)$ is necessarily **consistent**

2. **Search Strategies**

   True or False: (1pt per correct answer)

   - (True) or False: When all step costs of the problem are equal, Uniform Cost search is equivalent to Breadth-First search
   - (True) or False: The big advantage of iterative deepening over depth-first search is its linear space requirements.
   - True or (False) A* with a **consistent** heuristic expands all nodes reachable from the initial state satisfying $g(n) < C*$ where $C*$ is the cost of the optimal solution

3. **Graph Search Algorithm**

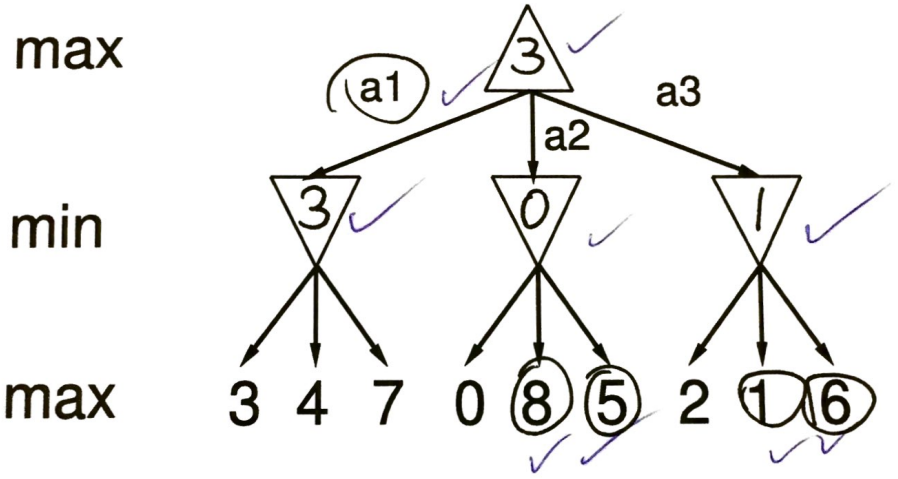
True or False: (1pt per correct answer)

- True or False: To guarantee optimality, A* Graph search guided by a **consistent** heuristic may have to re-expand nodes on the explored list
- True or False: To guarantee optimality, A* Graph Search guided by a **consistent** heuristic must test for the goal when nodes are generated (rather than dequeued from the frontier)

4. **Minimax with Alpha-Beta Pruning**

In the game tree below:

- Write the minimax value of the nodes – do not use alpha-beta pruning (2pts)
- Circle the action (a1, a2, or a3) taken by minimax at the top of the tree (2pts)
- Circle all leaves alpha-beta pruning would prune (4pts)



5. **Properties of Alpha-Beta Pruning**

True or False: (1pt per correct answer)

- True or False: when using alpha-beta pruning, the run-time savings are dependent of the order in which the nodes are expanded
- True or False: when the game tree is completely explored, alpha-beta pruning always return the same value as minimax for the root node of the tree