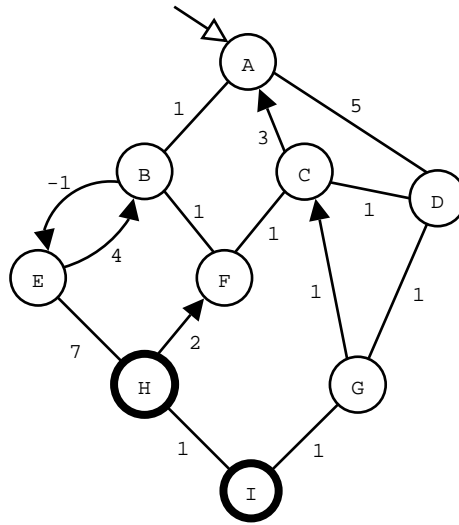


CS347 SP2005 Exam 1

This is a closed-book closed-notes exam. The *only* items you are permitted to bring are writing implements. Mark every sheet of paper you use with your name and the string “cs347sp2005 exam1” (omittance, even if it is partial, will be penalized at 1 point per sheet). 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 75 (excluding the 5 bonus points). You have 75 minutes to complete this exam. Good luck!

1. Define in a single sentence what a rational agent is. [5]
2. What is “Lady Lovelace’s Objection”? [5]
3. Give the PEAS description for the Plank Puzzle. [5]
4. Classify the Plank Puzzle task environment according to the following properties and explain your answers: [6]
 - Fully observable/partially observable
 - Deterministic/stochastic
 - Episodic/sequential
5. Give a formal description of the Plank Puzzle by defining the initial state, successor function, goal test, and path cost function. [8]

All the following questions are about the following state space graph, with A being the start state and H & I being goal states. The order in which successors are generated is counterclockwise, ending at exactly 9 o’clock. Example: C generates first F, then D, and finally A. When sorting by path-cost, nodes with equal path-cost are ordered such that the earlier a node is generated, the higher its priority. Nodes already on the open list have higher priority than newly added nodes with equal path-cost.



6. Give the execution trace of ID-DFTS. [12]
 7. Give the execution trace of UCGS. [10]
 8. Give the execution trace of GBeFGS employing as heuristic $h(n)$ = the minimal number of steps from node n to the nearest goal node. [8]
 9. Is UCGS optimal for this problem? Explain your answer! [5]
 10. Is GBeFGS employing the above described heuristic $h(n)$ optimal for this problem? Explain your answer! [2]
 11. Is ID-DFTS optimal for this problem? Explain your answer! [2]
 12. Are there depths l for which DLTS would be incomplete for this problem? If yes, give those depths; otherwise explain why not. [2]
 13. Is there a step cost associated with a *single* action that can be changed in the state space graph which would make ID-DFTS not complete? (Note: bidirectional edges represent two separate actions, each with their own step cost). If yes, then give the action and new step cost; otherwise, explain why not. [3]
 14. Is there a step cost associated with a *single* action that can be changed in the state space graph which would make UCGS not complete? (Note: bidirectional edges represent two separate actions, each with their own step cost). If yes, then give the action and new step cost; otherwise, explain why not. [2]
- BONUS Are there state spaces for which DLTS with $l < diameter$ is optimal? Explain your answer! [5]