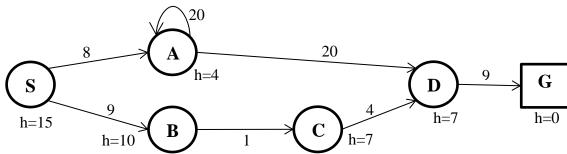# CS-171, Intro to A.I., Winter Quarter, 2015 — Quiz # 1 — 20 minutes

NAME: _____

YOUR ID: _____ ID TO RIGHT: _____ ROW: _____ NO. FROM RIGHT: _____

1. (24 pts total, 1 pt each) Search Properties. Fill in the values of the four evaluation criteria for each search strategy shown. Assume a tree search where b is the finite branching factor; d is the depth to the shallowest goal node; m is the maximum depth of the search tree and may be infinite; l is the depth limit; step costs are identical and equal to some positive ε; in bidirectional search both directions use breadth-first search.

Note: These assumptions are the same as in Figure 3.21 of your textbook.

	Complete?	Time complexity	Space complexity	Optimal?
Depth-First				
Breadth-First				
Uniform-Cost				
Depth-Limited				
Iterative Deepening				
Bidirectional (if applicable)				

2. (16 pts total, 4 pts each) Task Environment. Your book defines a task environment as a set of four things, with acronym PEAS.

Fill in the blanks with the names of the PEAS components.

P_____   E_____   A_____   S_____

**** TURN PAGE OVER AND CONTINUE ON THE OTHER SIDE ****

3. (60 pts total, 10 pts each) Execute Tree Search through this graph (i.e., do not remember visited nodes). Step costs are given next to each arc. Heuristic values are given next to each node (as h=x). The successors of each node are indicated by the arrows out of that node. <u>Successors are returned in top-to-bottom order. Specifically, the children of S are (A, B) and the children of A are (A, D), in that order.</u>

For each search strategy below, show the order in which nodes are expanded (i.e., to expand a node means that its children are generated), ending with the goal node that is found. Show the path from start to goal, or write "None". Give the cost of the path found, if any. The first one is done for you, as an example.

3.a. DEPTH FIRST SEARCH.

Order of node expansion: <u>S A A A A ...</u>

Path found: <u>None</u>   Cost of path found: <u>None</u>

3.b. (10 pts) BREADTH FIRST SEARCH.

Order of node expansion: _____

Path found: _____   Cost of path found: _____

3.b. (10 pts) UNIFORM COST SEARCH.

Order of node expansion: _____

Path found: _____   Cost of path found: _____

3.c. (10 pts) GREEDY (BEST-FIRST) SEARCH.

Order of node expansion: _____

Path found: _____   Cost of path found: _____

3.d. (10 pts) ITERATED DEEPENING SEARCH.

Order of node expansion: _____

Path found: _____   Cost of path found: _____

3.e. (10 pts) A* SEARCH.

Order of node expansion: _____

Path found: _____   Cost of path found: _____

3.f. (10 pts total, 5 pts each) Is the heuristic admissible at nodes B & C? (Yes or No) _____

Is the heuristic consistent at nodes B & C? (Yes or No) _____