CS-171, Intro to A.I., Spring Quarter, 2011 — Quiz # 1 — 20 minutes

1. (2 pts) NAME AND EMAIL ADDRESS: _____
YOUR ID: _____ ID TO RIGHT:_____ ROW:_____ NO. FROM RIGHT:_____

2. (30 pts total, 2 pts each) For each of the following terms on the left, write in the letter corresponding to the best answer or the correct definition on the right. The first one is done for you as an example.

A .	Agent	A	Perceives environment by sensors, acts by actuators
	Percept	B	All states reachable from the initial state by a sequence of actions
	Performance Measure	C	Guaranteed to find a solution if one is accessible
	Rational Agent	D	Process of removing detail from a representation
	State Space	E	Maximum number of successors of any node
	Search Node	F	Set of all leaf nodes available for expansion at any given time
	Link between nodes	G	Estimates cost of cheapest path from current state to goal state
	Path	H	Guaranteed to find lowest cost among all accessible solutions
	Abstraction	I	Represents a state in the state space
	Optimal Search	J	Sequence of states connected by a sequence of actions
	Complete Search	K	Agent's perceptual inputs at any given instant
	Expand a state	L	Agent that acts to maximize its expected performance measure
	Frontier	M	Apply each legal action to a state, generating a new set of states
	Search Strategy	N	Represents an action in the state space
	Branching Factor	O	How a search algorithm chooses which node to expand next
	Heuristic Function	P	Evaluates any given sequence of environment states for utility

3. (8 pts total, 2 pts each) 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_____

4. (30 pts total, -2 for each wrong answer, but not negative) 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; l is the depth limit; step costs are identical and equal to some positive ε; and in Bidirectional search both directions use breadth-first search.

Criterion	Complete?	Time complexity	Space complexity	Optimal?
Breadth-First	[a]			[c]
Uniform-Cost	[a,b]			
Depth-First				
Iterative Deepening	[a]			[c]
Bidirectional (if applicable)	[a,d]			[c,d]

[a] if b is finite
[b] if step costs $\geq \varepsilon > 0$
[c] if step costs are all identical
[d] if both directions use breadth-first search

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5. (30 pts total, -2 for each wrong answer, but not negative) Use the following tree to indicate the order that nodes are expanded, for different types of search. Assume that A is the start node and G (double box) is the only goal node. Here, path costs are shown to the right of each path, g = cost of path so far, h = estimate of remaining cost to goal, f = estimate of total path cost.

a. Uniform-cost search.

b. Iterative deepening depth-first search.

c. Greedy best-first search.

d. A* search.

e. Is the heuristic h admissible? (Y or N) _____