For each question on Quiz #1, “Zero” below gives the fraction of students who scored zero, “Partial” gives the fraction who got partial credit, and “Perfect” gives the fraction who scored 100%. Percentages may not sum to 100% because some students did not take the quiz.

Problem 1
Zero: 0% (~0 students), Partial: 34% (~63 students), Perfect: 61% (~115 students)

Problem 2
Zero: 7% (~14 students), Partial: 24% (~44 students), Perfect: 64% (~120 students)

Problem 3
Zero: 2% (~4 students), Partial: 52% (~97 students), Perfect: 41% (~77 students)

CS-171, Intro to A.I., Fall Quarter, 2014 — Quiz # 1 — 20 minutes

NAME: _____

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

1. (45 pts total, 3 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
K	Percept	B	All states reachable from the initial state by a sequence of actions
P	Performance Measure	C	Guaranteed to find a solution if one is accessible
L	Rational Agent	D	Process of removing detail from a representation
B	State Space	E	Maximum number of successors of any node
I	Search Node	F	Set of all leaf nodes available for expansion at any given time
N	Link between nodes	G	Estimates cost of cheapest path from current state to goal state
J	Path	H	Guaranteed to find lowest cost among all accessible solutions
D	Abstraction	I	Represents a state in the state space
H	Optimal Search	J	Sequence of states connected by a sequence of actions
C	Complete Search	K	Agent's perceptual inputs at any given instant
M	Expand a state	L	Agent that acts to maximize its expected performance measure
F	Frontier	M	Apply each legal action to a state, generating a new set of states
O	Search Strategy	N	Represents an action in the state space
E	Branching Factor	O	How a search algorithm chooses which node to expand next
G	Heuristic Function	P	Evaluates any given sequence of environment states for utility

2. (20 pts total, 5 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<u>erformance (measure)</u> E<u>nvironment</u> A<u>ctuators</u> S<u>ensors</u>

See p. 40, section 2.3.1.

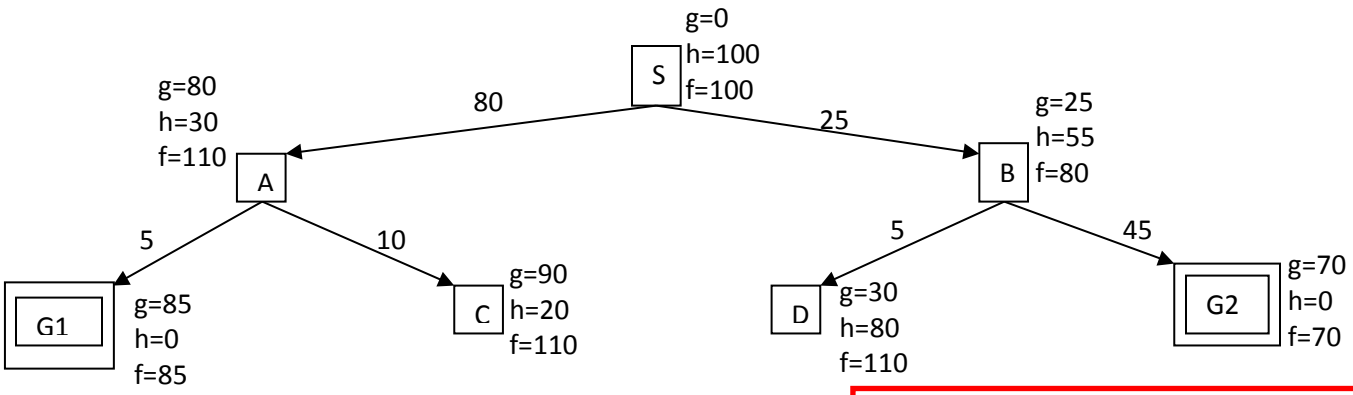
****** TURN PAGE OVER AND CONTINUE ON THE OTHER SIDE ******

3. (35 pts total) Search the following tree using the indicated search strategy. Assume that S is the start node and G1 and G2 are both goal nodes (double boxes). 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.

By convention, when a node is expanded the children are returned from the expansion in left-to-right order. Expanding S yields (A, B); expanding A yields (G1, C); and expanding B yields (D, G2); in that order.

For each search strategy below (i.e., to expand a node means that its node that is found. Show the path fro the path found, if any. The first one is done for you, as an example.

Please see the lecture slides for Uninformed Search, topic "When to do Goal-Test? When generated? When popped?" for clarification about exactly what to do in practical cases.



3.a. DEPTH FIRST SEARCH.

Order of node expansion: S A G1

See section 3.4.3.

DFS does the Goal-test before the child is pushed onto the queue. The goal is found when A is expanded.

Path found: S A G1 Cost of path found: 85

3.b. (15 pts) ITERATED DEEPENING SEARCH.

Order of node expansion: S S A G1

See section 3.4.5

IDS does the Goal-test before the child is pushed onto the queue. The goal is found when A is expanded.

Path found: S A G1 Cost of path found: 85

3.c. (15 pts) A* SEARCH.

Order of node expansion: S B G2

See section 3.5.2.

A* does the Goal-test when the node is popped off the queue.

Path found: S B G2 Cost of path found: 70

3.d. (5 pts) Is the heuristic admissible? (Y=Yes or N=No) N

See section 3.5.2.

E.g., at node B, h(B)=55 but h*(B)=45, so the heuristic overestimates.