

ICS 171 — Quiz #1 — TWENTY (20) minutes

1. (5 pts) NAME AND EMAIL ADDRESS: \_\_\_\_\_

YOUR ID: \_\_\_\_\_ ID TO RIGHT: \_\_\_\_\_ ROW: \_\_\_\_\_ NO. FROM RIGHT: \_\_\_\_\_

2. (40 pts total, -5 each wrong answer, but not negative) For each of the following terms on the left, write in the letter corresponding to the correct definition on the right. The first one is done for you as an example.

<u>A</u>	Agent	A.	Perceives environment by sensors, acts by actuators.
<u>W</u>	Percept	B.	Imparts knowledge to a search algorithm.
<u>U</u>	Agent Function	C.	Guaranteed to find a best solution.
<u>P</u>	Performance Measure	D.	Process of removing detail from a representation.
<u>S</u>	Rational Agent	E.	Returns a set of $\langle action, resulting\ state \rangle$ .
<u>K</u>	Problem (formal definition)	F.	Determines whether a state is a goal state.
<u>N</u>	Path	G.	A path from the initial state to a goal state.
<u>Y</u>	Initial State	H.	Estimated total path cost never decreases.
<u>E</u>	Successor Function	I.	Cost for taking action $a$ to go from state $x$ to $y$ .
<u>O</u>	State Space	J.	A solution with lowest cost of all solutions.
<u>F</u>	Goal Test	K.	{Initial State, Actions, Goal Test, Path Cost}.
<u>X</u>	Path Cost Function	L.	Never overestimates cost to reach goal.
<u>I</u>	Step Cost	M.	Nodes generated but not yet expanded.
<u>G</u>	Problem Solution	N.	A sequence of states connected by actions.
<u>J</u>	Optimal Solution	O.	The set of states reachable from initial state.
<u>D</u>	Abstraction	P.	Criterion for success of agent's behavior.
<u>T</u>	Expand a state	Q.	Guaranteed to find a solution if it exists.
<u>V</u>	Search Strategy	R.	Represents a state in search tree.
<u>M</u>	Fringe or Frontier	S.	Agent maximizes expected performance measure.
<u>Q</u>	Complete	T.	Apply successor function, generating new states.
<u>C</u>	Optimal	U.	Maps any given percept sequence to an action.
<u>R</u>	Node	V.	Determines choice of which node to expand next.
<u>B</u>	Heuristic Function	W.	The agent's perceptual inputs at any instant.
<u>L</u>	Admissable Heuristic	X.	Assigns a numeric cost to each path.
<u>H</u>	Consistency (monotonicity)	Y.	State where the agent starts.

3. (10 pts) In general, which is the preferred uninformed search method when there is a large search space and the depth of the solution is unknown? (Mark one blank with "X")

depth-first search     
  breadth-first search     
  uniform-cost search  
 depth-limited search     
  iterative-deepening search

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3. (25 pts total, -5 each wrong answer, but not negative) Assume that the state space is infinitely deep, there are cycles and loops, multiple goal nodes exist with different costs, and the path cost function never decreases along a path.

3a. Is depth-first search complete? N optimal? N (“Y” = yes, “N” = no)

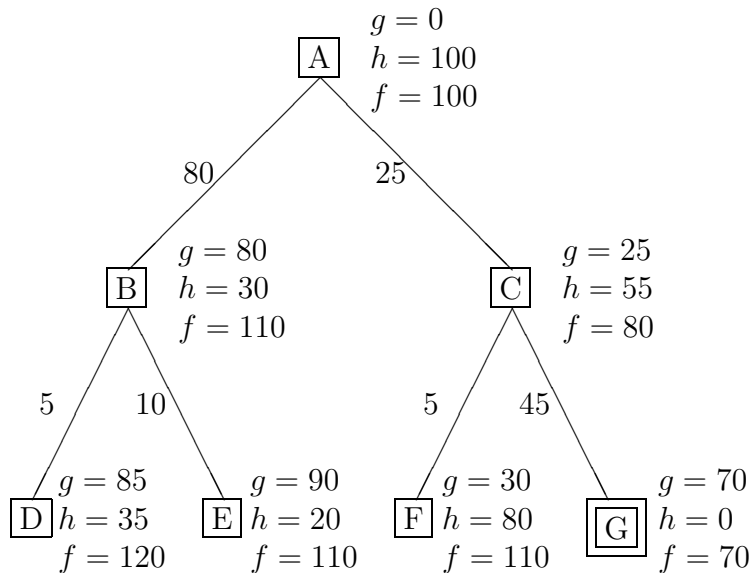
3b. Is breadth-first search complete? Y optimal? N (“Y” = yes, “N” = no)

3c. Is uniform-cost search complete? Y optimal? Y (“Y” = yes, “N” = no)

3d. Is depth-limited search complete? N optimal? N (“Y” = yes, “N” = no)

3d. Is iterated-deepening search complete? Y optimal? N (“Y” = yes, “N” = no)

4. (5 pts each, 20 pts total) Use the following tree to indicate the order that nodes are expanded, for different types of search. Assume that 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.



For each search strategy, write down the order in which nodes are expanded. Stop at G.

(4a) UNIFORM-COST SEARCH:

A C F G \_\_\_\_\_

(4b) GREEDY BEST-FIRST SEARCH:

A B E D C G \_\_\_\_\_

(4c) A\* SEARCH:

A C G \_\_\_\_\_

(4d) ITERATIVE DEEPENING DEPTH-FIRST SEARCH:

A A B C A B D E C F G