CS-171, Intro to A.I., Winter Quarter, 2018 — Quiz # 1 — 20 minutes

NAME:____

YOUR ID: ___________ ID TO RIGHT:__________ ROW:_____ NO. FROM RIGHT:______

1. (45 pts total, 3 pts each) Agent/Search Concepts. 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 (children) of any node
	Search Node	F	Set of all pending 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/Fringe	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

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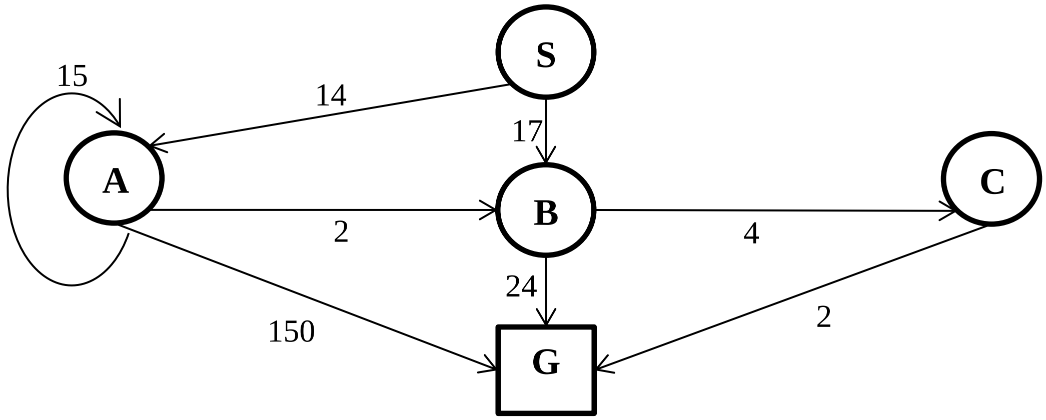
2. (55 pts total, 11 pts each) STATE-SPACE SEARCH STRATEGIES. Execute Tree Search through this graph (i.e., do not remember visited nodes). Step costs are given next to each arc. The successors of each node are indicated by the directed arrows out of that node. Successors are returned in left-to-right order, i.e., successors of S are (A, B), successors of A are (A, G, B), and successors of B are (G, C), in that order. S is the only initial node, and G is the only goal node.

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), optionally ending with the goal node that is found, or indicate the repeating cycle if the search gets stuck in a loop. Show the path from start to goal, or write "None." Give the cost of the path that is found, or write "None." Do check for (higher-cost) duplicate nodes in the Fringe/Frontier, and treat them appropriately. Do not check for loops, nor for duplicate nodes in Expanded.



2.a. (11 pts total) DEPTH FIRST SEARCH.

(7 pts) Order of node expansion:____

(2 pts) Path found:______________________________________ **(2 pts)** Cost of path found:____________

2.b. (11 pts total) BREADTH FIRST SEARCH.

(7 pts) Order of node expansion: ____

(2 pts) Path found: ______________________________________ **(2 pts)** Cost of path found:____________

2.c. (11 pts total) UNIFORM COST SEARCH.

(7 pts) Order of node expansion:____

(2 pts) Path found: ______________________________________ **(2 pts)** Cost of path found:____________

2.d. (11 pts total) ITERATED DEEPENING SEARCH.

(7 pts) Order of node expansion: ____

(2 pts) Path found:______________________________________ **(2 pts)** Cost of path found:____________

2.e. (11 pts total) BIDIRECTIONAL SEARCH. Use Breadth First Search. First expand S, then expand G (invert the steps), then expand a node from Fringe(S), then expand a node from Fringe(G) (invert the steps), then expand a node from Fringe(S), then expand a node from Fringe(G) (invert the steps), and so on. On the backward search from G, assume nodes are returned in right-to-left order (which is left-to-right if you stand on your head); i.e., successors of G are (C, B, A), successor of C is (B), successors of B are (S, A), and successors of A are (S, A), in that order on the backward search.

(7 pts) Order of node expansion: ____

(2 pts) Path found: ______________________________________ **(2 pts)** Cost of path found:____________

Scratch Paper (1) Please Do Not Detach From Test

Scratch Paper (2) Please Do Not Detach From Test