CS-171, Intro to A.I., Winter Quarter, 2020 — Quiz # 1 — 25 minutes

NAME: _____ UCINetID _____

YOUR ID#: _____ ID# TO RIGHT: _____ ID# TO LEFT: _____ ROW: _____ SEAT: _____

1. (42 pts total, 3 pts each) SEARCH METHODS AND FAIRNESS. Say that a search method is **Fair** if, for any point in time during any search, it is guaranteed that every node on the fringe (= frontier = open-list = queue) at that point in time eventually will be expanded provided that a goal is not discovered in the meantime.

Say a search method is **Not Fair** if, for some point in time during some search, it is possible that some node on the fringe at that time might never be expanded even if no goal is ever discovered.

Here, you are doing Tree Search (that is, do not remember expanded nodes). Assume that $\varepsilon > 0$ is some small positive constant, and that every step cost is $\geq \varepsilon$ (that is, every step cost is bounded away from zero by ε). As always, the branching factor is finite.

Fill out this table of search conditions as F (= Fair) or N (= Not Fair) to indicate if they are Fair.

		SEARCH SPACE CHARACTERISTICS	
		Finite Graphs without Loops (i.e., without Cycles)	Infinite Graphs with Loops (i.e., with Cycles)
SEARCH METHOD	Depth First Search		
	Breadth First Search		
	Uniform Cost Search		
	Iterative Deepening Search		
	Bidirectional Search (using Breadth First Search)		
	Greedy Best First Search		
	A* Search		

2. (24 pts total, 4 pts each) Label the following statements as True (T) or False (F).

2.a. ____ Local search algorithms generally operate only on one (or a few) current node(s).

2.b. ____ Local search algorithms generally are used to find the globally optimal solution.

2.c. ____ In tabu search recently visited states are temporarily excluded from being visited again.

2.d. ____ The random restart wrapper randomly decides whether to return the current node or keep searching.

2.e. ____ Local search difficulties include shoulders, local maximums, "flat" local maximums, and ridges.

2.f. ____ Hill-climbing moves to the best successor that improves the current state, or returns if no such child.

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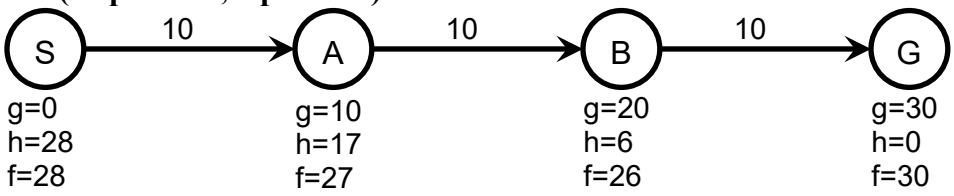
3. (30 pts total, 5 pts each) ADMISSIBLE AND CONSISTENT HEURISTICS. The problems below are very simple search problems; but this question is about Heuristics, not about Search. Step costs are indicated next to each arc. Next to each node is shown g = path cost so far, h = heuristic value, and f = g+h. S is the Start node and G is the Goal node. **Label the following search spaces as Y (= Yes) or N (= N) to indicate if the heuristic function shown is Admissible/Consistent.**

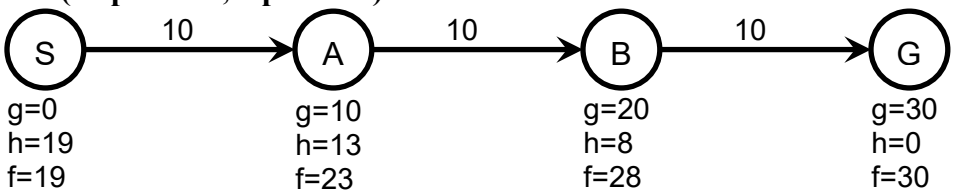
3.a. (10 pts total, 5 pts each)



3.a.i. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) admissible?

3.a.ii. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) consistent?

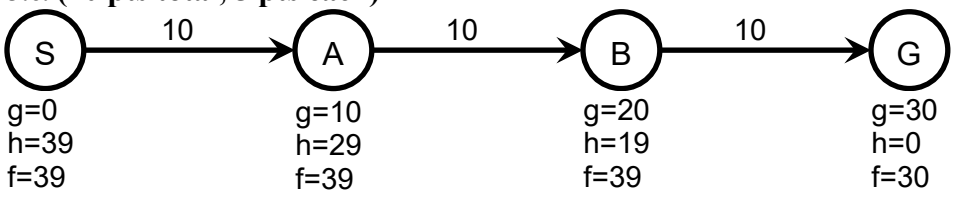
3.b. (10 pts total, 5 pts each)



3.b.i. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) admissible?

3.b.ii. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) consistent?

3.c. (10 pts total, 5 pts each)



3.c.i. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) admissible?

3.c.ii. (5 pts) (Answer Y=Yes or N=No) _____ Is the heuristic above (h) consistent?

4. (4 pts total, 1 pt each) Your book defines a task environment as a set of four things, with the acronym PEAS. Fill in the blanks with the names of the PEAS components.

P_____ E_____ A_____ S_____

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Scratch Paper (1) Please Do Not Detach from Test

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Scratch Paper (2) Please Do Not Detach from Test