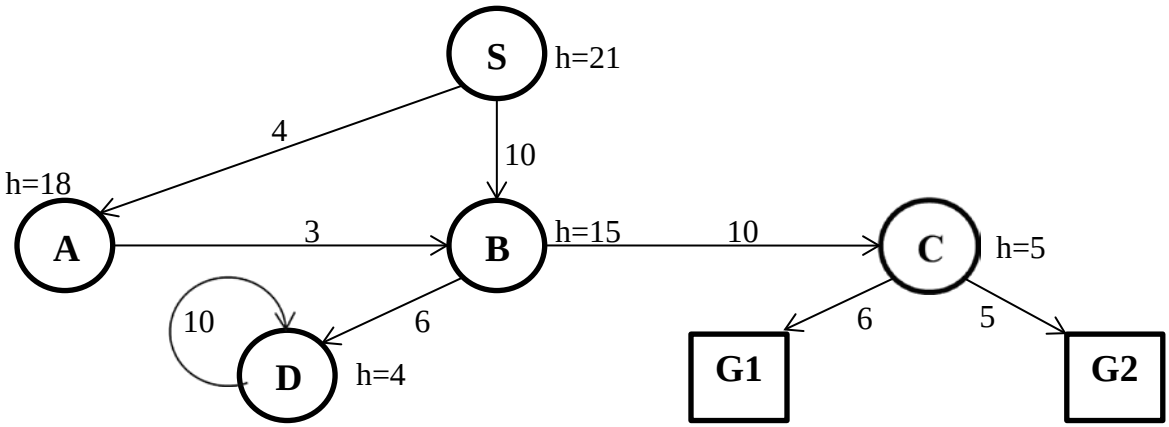
CS-171, Intro to A.I., Summer Quarter, 2016 — Quiz # 3 — 20 minutes

NAME: _____

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

1. (60 pts total, 12 pts each) STATE-SPACE SEARCH. Execute Tree Search through this graph (do not remember visited nodes, so repeated nodes are possible). It is not a tree, but pretend you don't know that. Step costs are given next to each arc, and heuristic values are given next to each node (as h=x). The successors of each node are indicated by the arrows out of that node. **(Note: D is a successor of itself).** As usual, successor nodes are returned in left-to-right order. (The successor nodes of S are A,B; and the successor nodes of B are D,C; in those node orders).

The start node is S and there are two goal nodes, G1 and G2. For each search strategy below, indicate **(1) the order** in which nodes are expanded, and **(2) the path and cost** to the goal that was found, if any. Write "None" for the path and cost if the goal was not found. The first one is done for you, as an example.



1.a. (example) DEPTH-FIRST SEARCH:

1.a.i Order of expansion: S A B D D D D ...

1.a.ii Path to goal found: None Cost of path found: None

1.b. (12 pts) BREADTH-FIRST SEARCH:

1.b.i Order of expansion: _____

1.b.ii Path to goal found: _____ Cost of path found: _____

1.c. (12 pts) ITERATIVE DEEPENING SEARCH:

1.c.i Order of expansion: _____

1.c.ii Path to goal found: _____ Cost of path found: _____

1.d. (12 pts) UNIFORM COST SEARCH:

1.d.i Order of expansion: _____

1.d.ii Path to goal found: _____ Cost of path found: _____

1.e. (12 pts) GREEDY BEST FIRST SEARCH:

1.e.i Order of expansion: _____

1.e.ii Path to goal found: _____ Cost of path found: _____

1.f. (12 pts) A* SEARCH:

1.f.i Order of expansion: _____

1.f.ii Path to goal found: _____ Cost of path found: _____

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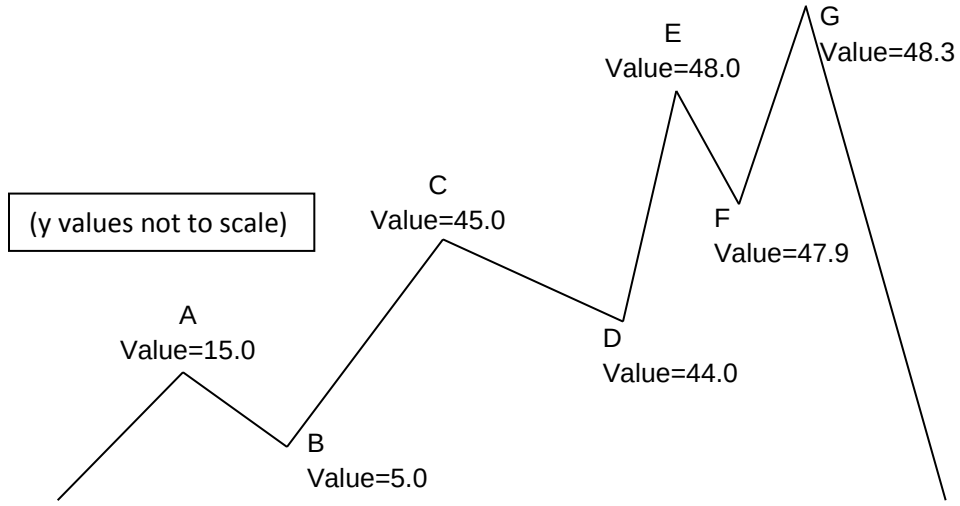
2. (40 pts total, 5 pts each) LOCAL SEARCH --- SIMULATED ANNEALING.
This question asks about Simulated Annealing local search. In the value landscape cartoon below, you will be asked about the probability that various moves will be accepted at different temperatures. Recall that Simulated Annealing always accepts a better move (ΔValue = Value[next] – Value[current] > 0.0); but it accepts a worse move (ΔValue < 0.0) only with probability e^(ΔValue/T), where T is the current temperature on the temperature schedule.

Please use this temperature schedule (usually, it is a decaying exponential; but it is simplified here):

time (t)	1-100	101-200	201-300
Temperature (T)	10.0	1.0	0.1

You do not need a calculator; the values given have been chosen to follow this table:

x	0.0	-0.1	-0.4	-1.0	-4.0	-40.0
e^x	1.00	≈0.90	≈0.67	≈0.37	≈0.02	≈4.0e-18



Give your answer to two significant decimal places. **The first one is done for you as an example.**

2.a. (example) You are at Point A and t=23. **The probability you will accept a move A -> B =** 0.37

2.b. (5 pts) You are at Point B and t=23. **The probability you will accept a move B -> C =** _____

2.c. (5 pts) You are at Point C and t=123. **The probability you will accept a move C -> B =** _____

2.d. (5 pts) You are at Point C and t=123. **The probability you will accept a move C -> D =** _____

2.e. (5 pts) You are at Point E and t=123. **The probability you will accept a move E -> D =** _____

2.f. (5 pts) You are at Point E and t=123. **The probability you will accept a move E -> F =** _____

2.g. (5 pts) You are at Point G and t=123. **The probability you will accept a move G -> F =** _____

2.h. (5 pts) You are at Point G and t=223. **The probability you will accept a move G -> F =** _____

2.i. (5 pts) With a very, very, very long slow annealing schedule, are you more likely, eventually in the long run, to wind up at point A or at point G? **(write A or G)** _____.