CS-171, Intro to A.I., Fall Quarter, 2017 — Quiz # 1 — 20 minutes

NAME:____

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

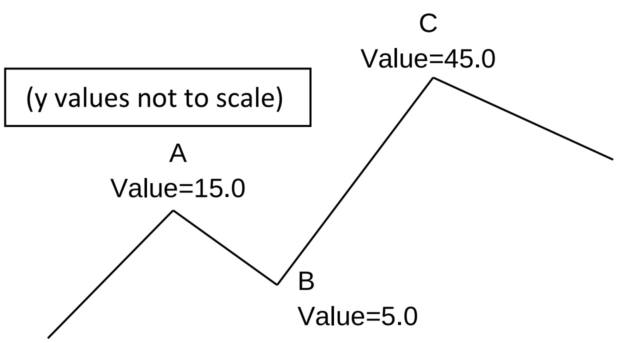
1. (20 pts total, 4 pts each) LOCAL SEARCH --- SIMULATED ANNEALING.
In the value landscape cartoon below, you will be asked about the probability that various moves will be accepted at different temperatures. Recall that Simulated Annealing always accepts a better move (ΔValue = Value[next] − Value[current] > 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; <u>but it is simplified here</u>):

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

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

x	−1.0	−4.0	−10.0	−40.0
e^x	≈0.37	≈0.02	≈4.5e−5	≈4.0e−18



Give your answer using numbers from the table above. **<u>The first one is done for you as an example.</u>**

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

1.b. (4 pts) You are at Point B and t=23. The probability you will accept a move B -> A = ____________

1.c. (4 pts) You are at Point B and t=23. The probability you will accept a move B -> C = ____________

1.d. (4 pts) You are at Point C and t=23. The probability you will accept a move C -> B = ____________

1.e. (4 pts) You are at Point C and t=123. The probability you will accept a move C -> B = ____________

1.f. (4 pts) Starting at point A, with a very, very, very long slow annealing schedule, <u>are you more likely, eventually in the long run, to wind up at point A or at point C?</u> **(write A or C)** ________________.

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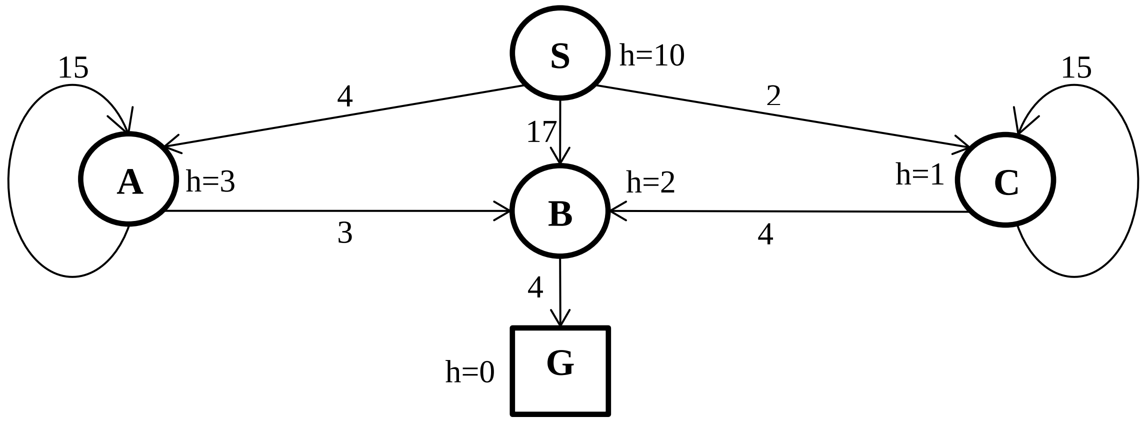
STATE-SPACE SEARCH STRATEGIES. Execute Tree Search through this graph (i.e., do not remember visited nodes). Step costs are given next to each arc. Heuristic values are given next to each node (as h=x). The successors of each node are indicated by the arrows out of that node. Successors are returned in left-to-right order, i.e., successors of S are (A, B, C), successors of A are (A, B), and successors of C are (B, C), in that order.

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), 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."



The first one is done for you as an example.

(Example.) DEPTH FIRST SEARCH.

Order of node expansion: S A A A A A ...______________________________________

Path found: None____ Cost of path found:____None___

2. (20 pts total) UNIFORM COST SEARCH.

(10 pts) Order of node expansion:____

(5 pts) Path found: ____**(5 pts)** Cost of path found:____________

3. (20 pts total) GREEDY BEST-FIRST SEARCH.

(10 pts) Order of node expansion: ____

(5 pts) Path found: ____**(5 pts)** Cost of path found:____________

4. (20 pts total) ITERATED DEEPENING SEARCH.

(10 pts) Order of node expansion: ____

(5 pts) Path found: ____**(5 pts)** Cost of path found:____________

5. (20 pts total) A* SEARCH.

(10 pts) Order of node expansion: ____

(5 pts) Path found: ____**(5 pts)** Cost of path found:____________