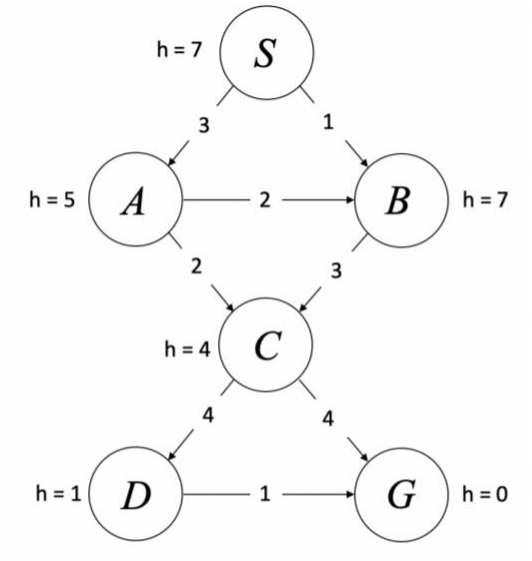
CS 101 Fall 2020 - Quiz 10-B

12/10/2020 - 20 Minutes **Name:** **ID number:** **Score:**

Remember that your work is graded on the quality of your writing and explanation as well as the validity.

1. (3'+3'+4') Consider A* algorithm on the following graph. Edges are labeled with their costs, and heuristic values h for states are labeled next to the states. S is the start state, and G is the goal state. Assume ties are broken in alphabetical order. Write your answer in the box provided.



(1)	(2)

(1) The heuristic value is:
   (A) Admissible
   (B) Consistent
   (C) Neither

(2) Given the above heuristics, what are the states not going to be expanded, assuming we run A* graph search with the heuristic values provided.
   (A) A
   (B) B
   (C) C
   (D) D
   (E) S
   (F) G

(3) Assuming we run A* graph search with the heuristic values provided, what path is returned?

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2. (10') Consider the following implementation of the Floyd-Warshall algorithm. Assume $w_{ij} = \infty$ where there is no edge between vertex i and vertex j, and assume $w_{ii} = 0$ for every vertex i.

Algorithm 1 Floyd-Warshall

```
for i = 1 to n do
  for j = 1 to n do
    A[i, j, 0] = w_ij
    P[i, j] = −1
  end for
end for
for k = 1 to n do
  for i = 1 to n do
    for j = 1 to n do
      A[i, j, k] = A[i, j, k − 1]
      if A[i, j, k] > A[i, k, k − 1] + A[k, j, k − 1] then
        A[i, j, k] = A[i, k, k − 1] + A[k, j, k − 1]
        P[i, j] = k
      end if
    end for
  end for
end for
```

Assume matrix P, the output of the above algorithm, is given. Design an algorithm for finding the shortest path from u to v by using matrix P, and write its pseudo-code.