

Problem 1(1pts): Notes of discussion

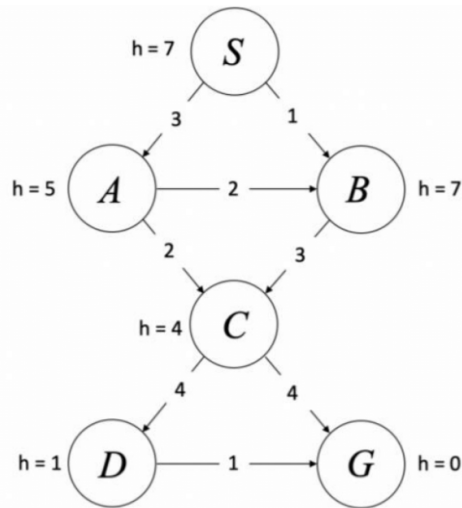
I promise that I will complete this QUIZ independently, and will not use any electronic products or paper-based materials during the QUIZ, nor will I communicate with other students during this QUIZ.

True or False: I have read the notes and understood them.

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Problem 2(2+4+3pts) Fill in the blanks

Consider the following directed graph in which we will apply A* graph search to find the shortest path from node A to node G .



(1) The given heuristic values are _____:

- (A) Admissible as well as consistent
- (B) Admissible but not consistent
- (C) Consistent but not admissible
- (D) Neither admissible nor consistent

(2) Write down the sequence of node popped from the priority queue when doing A* graph search. If several nodes have the same priority, pop them following alphabetical order.

_____.

(3) Based on (2), what path is returned?

_____.

Problem 4 (8pts) Floyd-Warshall

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

```

Matrix P is the output of the above algorithm, and we can use it to reconstruct the shortest path between two vertices.

Part of the algorithm for finding shortest path from vertex u to vertex v has been given. Please complete the pseudo-code for function $\text{FIND-PATH}(u, v, P)$.

Algorithm 2 SOLUTION(u, v, P)

```

if  $u == v$  then
  return  $\{u\}$ 
end if
return  $\{u\} + \text{FIND-PATH}(u, v, P) + \{v\}$ 

```

Algorithm 3 FIND-PATH(u, v, P)