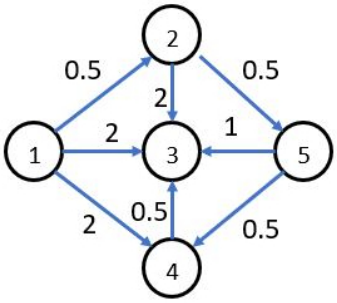
Congratulations! You passed!

Grade received 80% **Latest Submission Grade** 80% **To pass** 80% or higher

Go to next item

1. We will apply Dijkstra's algorithm for the following graph with the source vertex 1. 0.6 / 1 point



Here is the table of nodes with distances and parent values. Nodes 1 and 2 have already been visited or processed.

Node	Distance	Parent
1	0	NIL
2	0.5	1
3	2	1
4	2	1
5	1	2

Select all the correct facts about the subsequent working of the algorithm.

- [ ] The next node to be visited will be 5 and will cause edges (5,4) and (5,3) to be relaxed.
- [x] The priority queue (heap) has nodes 3, 4 and 5 with priorities 2, 2 and 1 respectively.

Correct
That is correct. Unvisited/unprocessed nodes will be in the priority queue with the distance estimates as the priority.

- [x] Dijkstra's algorithm will relax each edge exactly once during its entire execution.

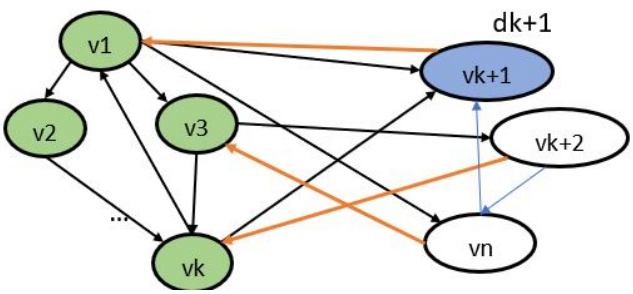
Correct
Correct. Specifically, an edge (u,v) is relaxed when its source node u is popped off the priority queue.

- [x] The next node to be visited will be node 3.

This should not be selected
Incorrect. The next node to be visited will be node with lowest priority that is as yet unvisited.

- [ ] The lowest priority node is node 1 and will be visited next.

2. In this question, we will examine some of the properties that are true of Dijkstra's algorithm in general. Here is a schematic of a graph representing an intermediate stage of running the algorithm. 1 / 1 point



The green nodes $v_1, \ldots, v_k$ represent nodes already visited or processed. The other nodes $v_{k+1}, \ldots, v_n$ represent the as yet unprocessed nodes with v_{k+1} representing the node with lowest priority given by d_{k+1} (assume all other unvisited nodes have strictly larger priority). Select all the true facts about properties of Dijkstra's algorithm from the list below.

- [x] For all visited nodes (green nodes in graph), the distance estimate is less than or equal to d_{k+1}.

Correct
Correct. This is because all edge weights are non-negative.

- [x] The shortest path to node v_{k+1} must have shortest path distance d_{k+1}.

Correct
Correct, as we argued in the lecture.

- [ ] A previously visited node can be added back to the priority queue as the algorithm runs.
- [x] The next node that will be visited by Dijkstra's algorithm is v_{k+1}.

Correct
Correct.

- [ ] It is possible that when an outgoing edge from v_{k+1} is relaxed in the subsequent step, the distance estimate to some green previously visited node decreases.