Congratulations! You passed!

Grade received 100% **Latest Submission Grade** 100% **To pass** 80% or higher

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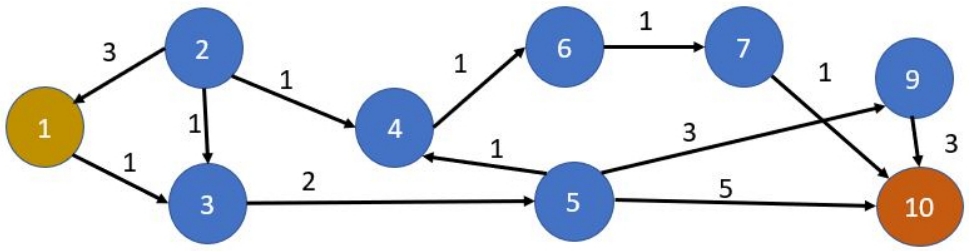
1. Consider the graph shown below: 1 / 1 point



We wish to find the shortest cost path between nodes 1 and 10. Select all the true facts from the list below:

- [x] The shortest path cost is 7.

Correct
Correct – it must go from 1 -> 3 -> 5 -> 4 -> 6 ->7 -> 10

- [ ] The shortest path goes from 1 -> 3 -> 5 -> 10
- [x] The shortest path goes from 1-> 3-> 5-> 4-> 6 -> 7-> 10

Correct
Correct. This path has cost 7 and is the shortest path.

- [ ] The path with the shortest cost must visit node 2.

2. Consider a graph G (not shown) without negative weights, wherein the shortest path from source 1 to destination 7 has cost 10 and has the edges: 1 / 1 point

$$(1) \xrightarrow{4} (2) \xrightarrow{3} (4) \xrightarrow{3} (7)$$

The costs of the edges are written over the arrows. Which of the following statements are true?

- [x] The shortest path cost from source 1 to destination 4 must be 7.

Correct
True since if the shortest cost path were lower, we could have used that path to reach the destination 10 with lower cost.

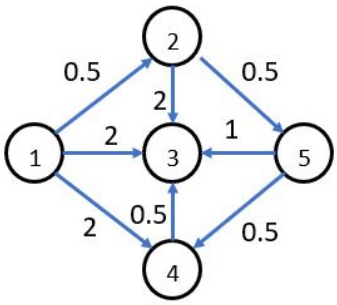
- [ ] Every other path in the graph from 1 to 7 has total cost strictly greater than 10.
- [x] Even if there are cycles in the graph G, they do not affect the shortest path cost since they will all be non-negative weight cycles.

Correct
Correct since we said all edge weights are non-negative.

- [ ] It is not possible to reach the destination from the source with a path that contains two or fewer edges.
- [x] If the edge (1,7) exists in the graph, then its edge weight must be greater than or equal to 10.

Correct
Correct – if not we would have found a shorter path from our source to destination.

3. Consider the graph shown below: 1 / 1 point



We have the following partially filled shortest path table for the single source "1". The rest have been left as ??? for you to answer through the questions below.

Node	Cost	Parent
1	0.0	NIL
2	0.5	1
3	2.0	???
4	???	???
5	1.0	???

Select all the correct answers from the list below.

- [x] The optimal path cost to the destination 4 is 1.5

Correct
Correct 1 -> 2 -> 5 -> 4

- [x] The parent node of 4 must be 5.

Correct
Correct -- it could have been either 1 or 5. But it cannot be 1, note that the path using the edge 1 -> 4 has larger cost.

- [ ] The parent node of 4 must be 1.
- [x] The parent node of 3 can be either 1, 5 or 4, but cannot be 2.

Correct
Correct – the optimal cost path to 3 is 2 which can be achieved by any of 3 different paths 1-> 3, 1 -> 2 -> 5 -> 3, 1 -> 2 -> 5 -> 4 -> 3 but not by the path 1-> 2->3 which has cost 2.5. Thus parent node for 3 could be 1, 5 or 3 but not 2.

- [ ] The parent node of 3 can be 1, 2, 4 or 5.