

Q1

2 Points

Here are four statements.

Three of these statements are TRUE, while one of these statements is FALSE.

Determine which of these statements is FALSE.

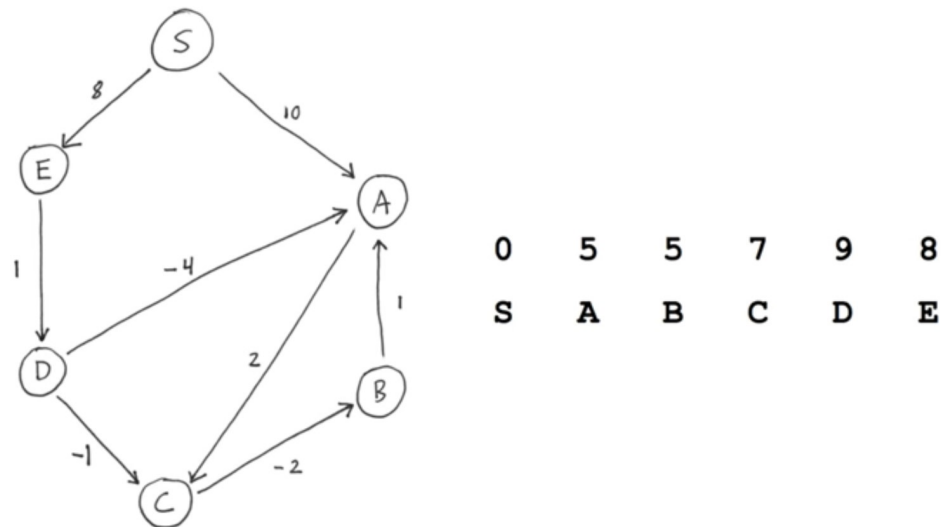
- ☐ Bellman-Ford and Dijkstra are both "Shortest Path" Algorithms.
- ☐ Both algorithms are typically applied to directed graphs, rather than undirected graphs.
- ☐ Bellman-Ford can detect cycles of negative weight, but Dijkstra cannot do this.
- ☒ Bellman-Ford always runs faster than Dijkstra, on any input graph.

Q2

5 Points

The Bellman-Ford Algorithm inputs a graph with edge weights, and finds the shortest path (i.e., the path minimizing the total weight of the edges on that path) between a given source vertex and each of the other vertices in the graph.

Please see the youtube video: <https://www.youtube.com/watch?v=obWXjtgOL64>, where the presenter walks through this specific problem.



Convince yourself that these numbers are correct.

For example, the shortest path from S to C indeed has distance 7, and this path is $S \rightarrow E \rightarrow D \rightarrow A \rightarrow C$.

You can quickly convince yourself that any path from S to C must require a total weight of 7, and that this number cannot be lowered.

Q2.1

3 Points

Using the above graph, suppose we change the weight of DA from -4 to -6.

If we were to run the Bellman-Ford Algorithm on this data set, our final table will look like this:

?	?	?	?	?	?
S	A	B	C	D	E

Your goal is to replace the ? marks with the actual numbers.

Determine the numbers of this table.

To make it easier for me to mark, please write down your numbers as an array of six numbers. For example, in the original question (where $DA=-4$), the correct answer would be [0, 5, 5, 7, 9, 8].

[0, 3, 3, 5, 9, 8]

Q2.2

2 Points

Now suppose we change the weight of edge CB in the diagram above, from -2 to -4.

In one or two sentences, explain why there is no longer a "shortest path" from S to C.

For the definition, we know that shortest path is calculated by adding costs of the possible paths from source to destination.

If we change the weight of edge CB from -2 to -4, which will have a negative cycle in AC-CB-BA. So, we will not have a shortest path from S to C.

Quiz 6 -DP

● GRADED

STUDENT

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TOTAL POINTS

7 / 7 pts

QUESTION 1

(no title)

2 / 2 pts

QUESTION 2

(no title)

5 / 5 pts

2.1 (no title)

3 / 3 pts

2.2 (no title)

2 / 2 pts