Started on	Sunday, 28 May 2023, 6:59 PM
State	Finished
Completed on	Sunday, 28 May 2023, 7:14 PM
Time taken	15 mins 31 secs
Grade	**8.00** out of 10.00 (**80**%)

Question 1

Incorrect

Mark 0.00 out of 1.00

Consider a weighted directed graph G = (V,E,w) and let X be a shortest s-t path for s,t $\in$ V. If we double the weight of every edge in the graph, setting w'(e) = 2 w(e) for each e $\in$ E, then X will still be a shortest s - t path in (V,E,w').

Select one:

○ True

◉ False ✗

The correct answer is 'True'.

Question 2

Correct

Mark 1.00 out of 1.00

Which algorithm is used to solve the single-source shortest path problem in a graph with negative edge weights?

Select one:

○ a.   Dijkstra's algorithm

○ b.   Kruskal's algorithm

○ c.   Prim's algorithm

◉ d.   Bellman-Ford algorithm ✔

Your answer is correct.

The correct answer is: Bellman-Ford algorithm

Question 3

Incorrect

Mark 0.00 out of 1.00

In the Bellman-Ford algorithm, how many iterations are required to find the shortest path in a graph with V vertices and E edges?

Select one:

○ a.   V

◉ b.   E - 1 ✖

○ c.   E

○ d.   V - 1

Your answer is incorrect.

The correct answer is: V - 1

Question 4

Correct

Mark 1.00 out of 1.00

Which of the following data structures is typically used in the implementation of Dijkstra's algorithm?

Select one:

◉ a.   Priority queue ✔

○ b.   Stack

○ c.   Queue

○ d.   Hash table

Your answer is correct.

The correct answer is: Priority queue

Question 5

Correct

Mark 1.00 out of 1.00

Which of the following statements are correct regarding shortest paths in graphs?

- ☑ a. All subpaths of a shortest path are shortest paths as well ✔

- ☐ b. Cycles with negative weights reachable from the source are acceptable in shortest path trees

- ☑ c. A shortest path can not contain cycles ✔

- ☐ d. Edges with negative weights reachable from the source are not acceptable in shortest path trees

Your answer is correct.

The correct answers are:
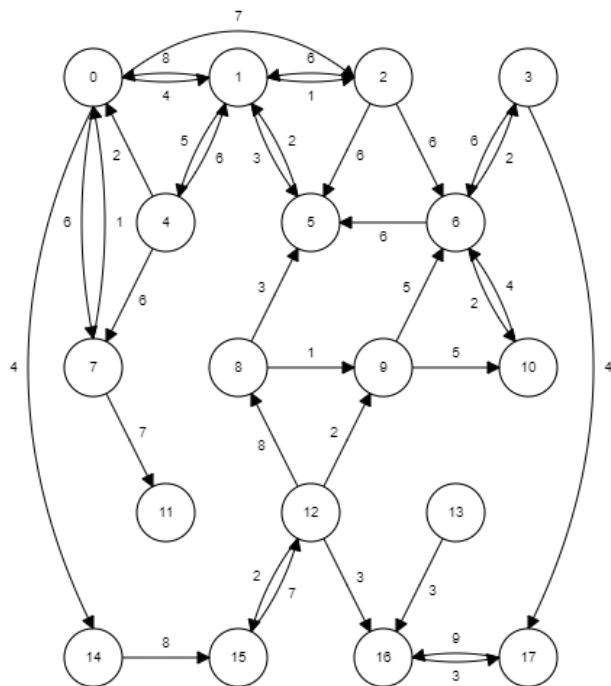
A shortest path can not contain cycles,

All subpaths of a shortest path are shortest paths as well

Question 6

Correct

Mark 1.00 out of 1.00

Suppose we executed Dijkstra algorithm on the following graph starting from 8.

That execution returned the following path from 8 to 12.

8 5 1 4 0 14 15 12

Which of the following is/are true?

Select one or more:

- ☑ a.   1 4 0 14 15 is a shortest path from 1 to 15 ✔

- ☑ b.   There is no path from 8 to 13 ✔

- ☐ c.   This graph has negative cycles

- ☐ d.   Cost of the shortest path from 8 to 4 is 12

Your answer is correct.

Paths inside a shortest path are shortest paths between respective vertices.

The correct answers are:
1 4 0 14 15 is a shortest path from 1 to 15,

There is no path from 8 to 13

Question 7

Correct

Mark 1.00 out of 1.00

To implement Dijkstra's shortest path algorithm on unweighted graphs so that it runs in linear time, the data structure to be used is:?

Select one:

- a.   Binary Tree
- b.   Stack
- c.   Heap
- d.   Queue ✔

If we use Queue (FIFO) instead of Priority Queue (Min Heap), we get the shortest path in linear time O(|V| + |E|).

The correct answer is: Queue

Question 8

Correct

Mark 1.00 out of 1.00

Which strategy does Djikstra's Algorithm follow?

Select one:

- a.   Exhaustive Search
- b.   Dynamic Programming
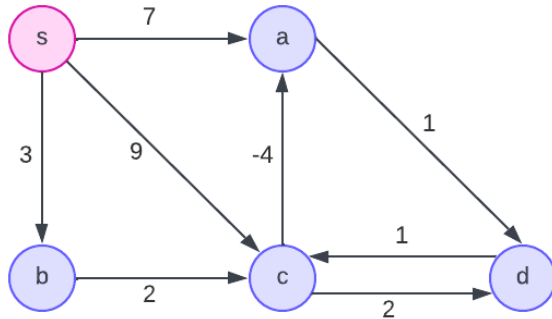- c.   Binary Search
- d.   Greedy ✔

The correct answer is: Greedy

Question 9

Correct

Mark 1.00 out of 1.00

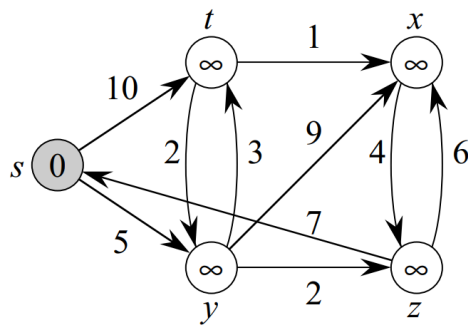What is the weight of the shortest path from source s to d in the following graph?

Answer: [2] ✔

The correct answer is: 2

Question 10

Correct

Mark 1.00 out of 1.00

Suppose we execute the first iteration of Bellman ford algorithm for the above graph. Take s as the source vertex. Recall that the order we process the edges inside an iteration can result in different results in intermediate iterations.

What can be a possible value at node **t** after 1st iteration? (i.e. iterating over all the edges 1 time)

Select one or more:

☐ a. 0

☑ b. 10 ✔

☐ c. Infinity

☑ d. 8 ✔

Your answer is correct.

The correct answers are:
10,

8