Week 6 Quiz [Fall 2019]

Due Oct 4 at 11:59pm **Points** 15 **Questions** 15
Available until Oct 5 at 11:59pm **Time Limit** None

Instructions

Submission Guidelines

This assignment has multiple-choice and numeric response questions. Only one submission is allowed, however as long as the quiz is not submitted, it is automatically saved and can be resumed.

Upon submission, make sure you have a record of the submission (with timestamp) on the assignment/quiz page on Canvas. If we do not have your submission in Canvas, you will **not** receive credit.

It is essential to follow these instructions to provide answers for this assignment. **Students who do not follow these guidelines will lose points.**

Attempt History

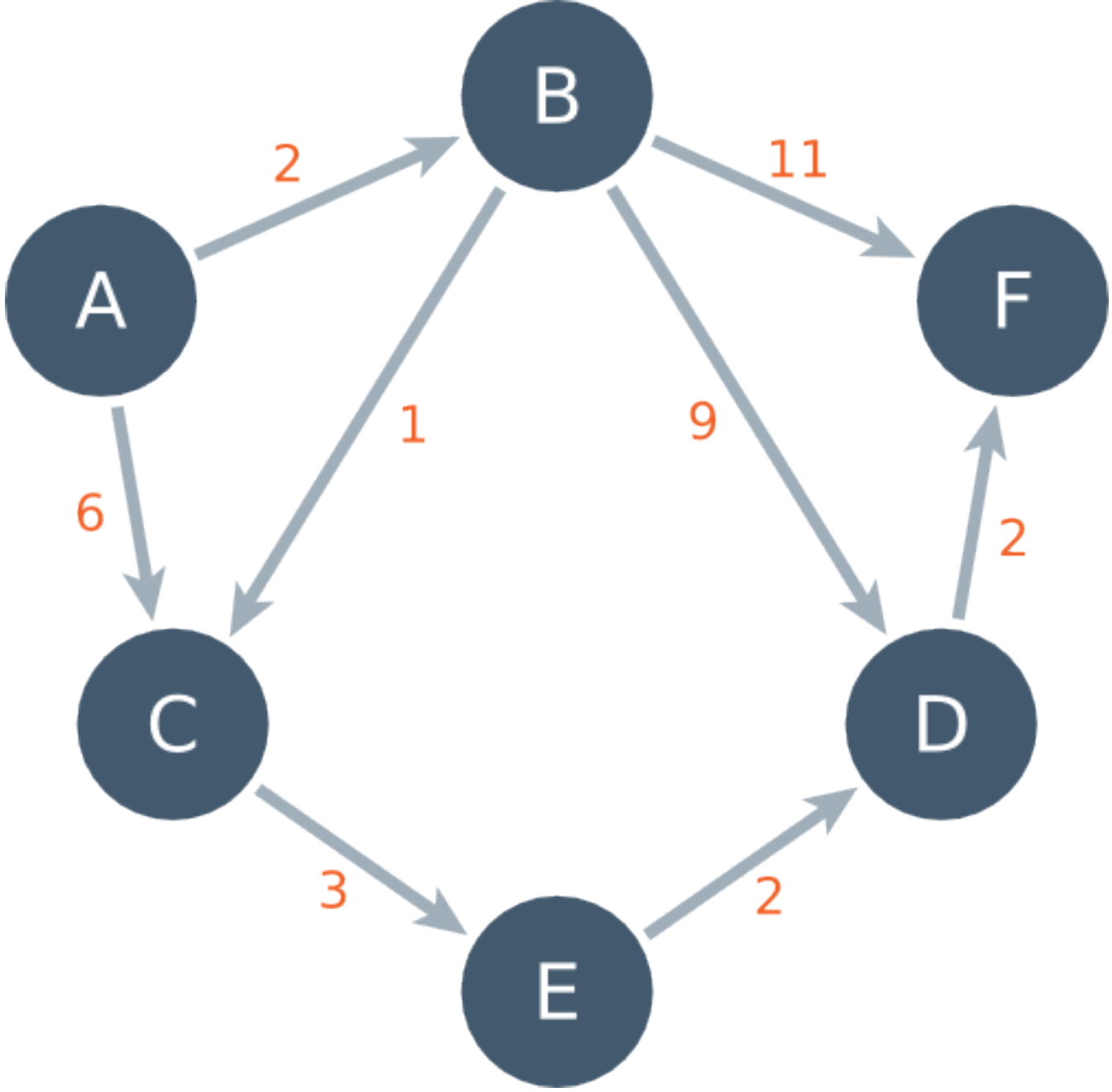
	Attempt	Time	Score
LATEST	Attempt 1	21 minutes	14 out of 15

Score for this quiz: **14** out of 15
Submitted Oct 4 at 9:55pm
This attempt took 21 minutes.

Question 1

1 / 1 pts

Use the following weighted, directed graph to answer the next few questions. The numbers next to the edges give the edge weights.



Which of the following accurately describes the connectivity of this graph?

Correct!

- (•) Weakly connected
- ( ) Strongly connected
- ( ) Unconnected
- ( )

Question 2

1 / 1 pts

Consider the graph from the previous question. What is the in-strength of node D?

Correct!

11

orrect Answers

11 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)

Question 3

1 / 1 pts

Consider the graph from the first question. What is the out-strength of node C?

Correct!

3

orrect Answers

3 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)

Question 4

1 / 1 pts

The *connected core*, or often just *core*, of a directed network is the largest strongly connected subgraph. Consider the graph from the first question. How many nodes are in the core of this graph?

Correct!

0

orrect Answers

1 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)
0 (with margin: 0)

Question 5

1 / 1 pts

Thinking back to the example of the Koningsberg bridges problem - if one wishes to transverse a network completely without backtracking, *at most*, how many nodes may have odd degree?

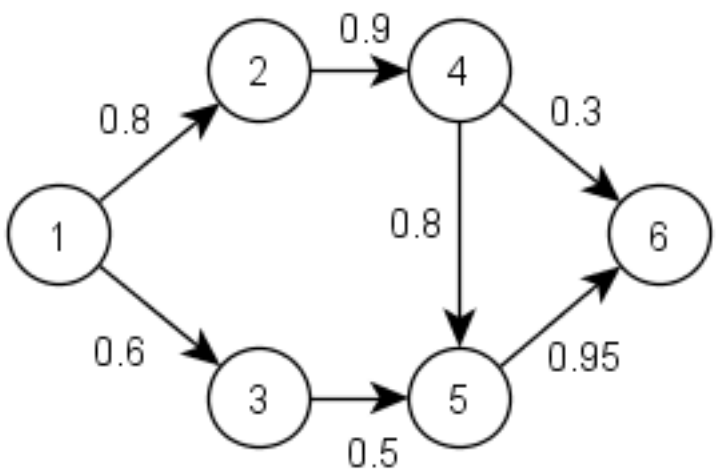
Correct!

- (•) 2
- ( ) 1
- ( ) Any even number
- ( ) Any odd number
- ( ) None
- ( ) It does not matter as long as the graph is unweighted

Question 6

1 / 1 pts

Use this graph to answer the following question:



Which of the following best describes this graph's connectivity?

- ( ) Strongly connected

Correct!

- (•) Weakly connected
- ( ) Unconnected
- ( ) None of the above

Question 7

1 / 1 pts

Edge weights can represent anything about the relationship between the nodes: strength of the relationship, physical distance, voltage flowing through a link cable, etc. When discussing path lengths on a weighted graph, one must first clarify or define how the weights are related to the distance.

The length of a path between two nodes is then the sum of the distances of the links in that
path.

The "simplest" such case occurs when the edge weights are equal to the distance. Consider the graph from the previous question and assume that the edge weights represent distances. Using this distance metric, which of the following represents the shortest path between nodes 1 and 6?

Correct!

- (•) 1, 2, 4, 6
- ( ) 1, 3, 5, 6
- ( ) 1, 2, 4, 5, 6
- ( ) None of these

Question 8

1 / 1 pts

Consider the previous graph, what is the collective weight of the in-degree edges of node 5?

Correct!

- (•) 1.3
- ( ) 1
- ( ) 0.95
- ( ) 0

Question 9

1 / 1 pts

Another common distance metric is to define the distance as the reciprocal of the edge weight (i.e. 1 divided by the edge weight). Examples of when this metric is used are when the edge weights represent probabilities or electrical resistance.

Consider again the graph from the two questions ago, and this time *assume that an edge's distance is defined as the reciprocal of the edge weight*. Using this distance metric, which of the following represents the shortest path between nodes 1 and 6?

Correct!

- (•) 1, 2, 4, 5, 6
- ( ) 1, 2, 4, 6
- ( ) 1, 3, 5, 6
- ( ) None of these

Question 10

1 / 1 pts

If there exists no shortest path between two nodes, we give its length as

Correct!

Undefined/infinite

0

1

We would not consider such cases

Question 11

1 / 1 pts

If you convert a weakly-connected directed network to an undirected network,
the resulting network will be connected.

Correct!

True

Weakly connected means connected if we disregard link directions, so by definition the undirected version is connected.

False

Question 12

0 / 1 pts

The in-component of a strongly connected component S is the set of nodes from which one can reach S, regardless of whether or not they can be reached from S

orrect Answer

False

You Answered

True

Question 13

1 / 1 pts

In order for a connected network to be considered a tree, it must contain how many links?

Correct!

N - 1

N

N(N-1) 2

N^2

Question 14

1 / 1 pts

In a tree network, what is the maximum number of children each leaf node can have before it is no longer considered a leaf?

Correct!

0

1

1, but only if the network is unweighted

There is no limit

The limit depends on what type of data is being represented

Question 15

1 / 1 pts

Which of the following is an algorithm used to find shortest paths?

Correct!

- breadth-first search
- Shortest-first-search
- Force-spring search
- All of the above

Quiz Score: **14** out of 15