

Introduction to Complexity (2021)

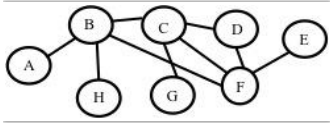
9.8 Take Unit 9 Test » Unit 9 Test

Instructions 1

You may use any course materials, websites, Netlogo models, calculators, etc. for this test. Just don't ask another person for the answers or your answers with other people.

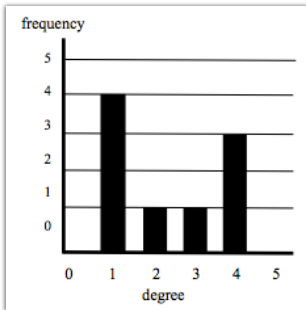
Question 2

Consider the following network.

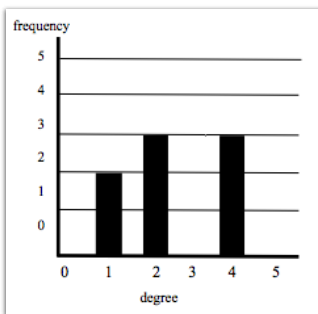


Which of the following is the correct degree distribution for this network?

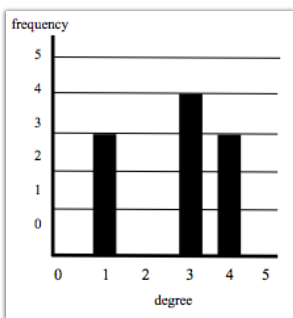
◦ A.



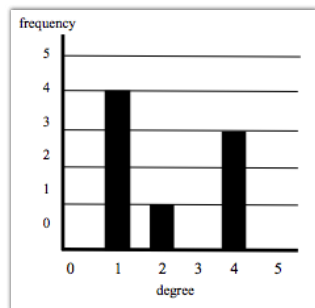
◦ B.



◦ C.



◦ D.



Question 3

For the network given in Question 1, what is the clustering coefficient? [Hint: Find the clustering with respect to each of the 8 nodes, and take the average. Nodes with only one link coming into them have clustering 0.]

- A. 0.5
 - B. 0.67
 - C. 0.75
 - D. 0.23
 - E. 0.46
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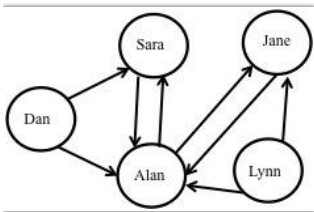
Question 4

For the network given in Question 1, how long is the shortest path between nodes A and E?

- A. 2 hops
 - B. 3 hops
 - C. 4 hops
 - D. 5 hops
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Question 5

Consider the network below:



What is Alan's in-degree?

- A. 2
 - B. 3
 - C. 4
 - D. 5
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Question 6

For the network given in Question 4, what is Alan's out-degree?

- A. 2
- B. 3
- C. 4
- D. 5

Question 7

Consider the following statements about small-world networks:

- I. In a small-world network, every pair of nodes has at most six degrees of separation.
- II. In a small-world network, the median path-length between pairs of nodes is 5.
- III. In a small-world network, there are relatively few long-distance links, but most pairs of nodes are separated by short paths.
- IV. Small-world networks tend to have a lower clustering coefficient than random networks with the same number of nodes and links.
- V. Small-world networks tend to have a higher clustering coefficient than random networks with the same number of nodes and links.

Which of these statements is true?

- A. I
 - B. II
 - C. II, III, and V
 - D. III and IV
 - E. III and V
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Question 8

Suppose you are presented with data from three different networks: Networks I, II, and III, all with the same number of nodes and links. You are told that one of them is a regular network, one is a small-world network, and one is a random network. For each network you calculate average path length and clustering coefficient, and get the following results:

Network	L (average path length)	C (clustering coefficient)
I	3.11	0.01
II	4.35	0.44
III	17	0.6

Which of the following should you conclude?

- A. Network I is the random network, II is the small-world network, and III is the regular network.
 - B. Network I is the small-world network, II is the random network, and III is the regular network.
 - C. Network I is the random network, II is the regular network, and III is the small-world network.
 - D. Network I is the small-world network, II is the regular network, and III is the random network.
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Question 9

Which of the following is true concerning scale-free networks?

- A. Any network with a "long-tailed" degree distribution is scale free.
- B. Any network that does not have a *normal* ("bell-curve") degree distribution is scale-free.
- C. Any network with a power-law degree distribution is scale free.
- D. Any network that has many hubs is scale-free

Question 10

Which of the following is true concerning scale-free networks?

- A. Most nodes have high degree.
- B. The degree distribution has a "long tail".
- C. They are robust to hub node failure.
- D. They have normal (bell-curve-shaped) degree distributions.