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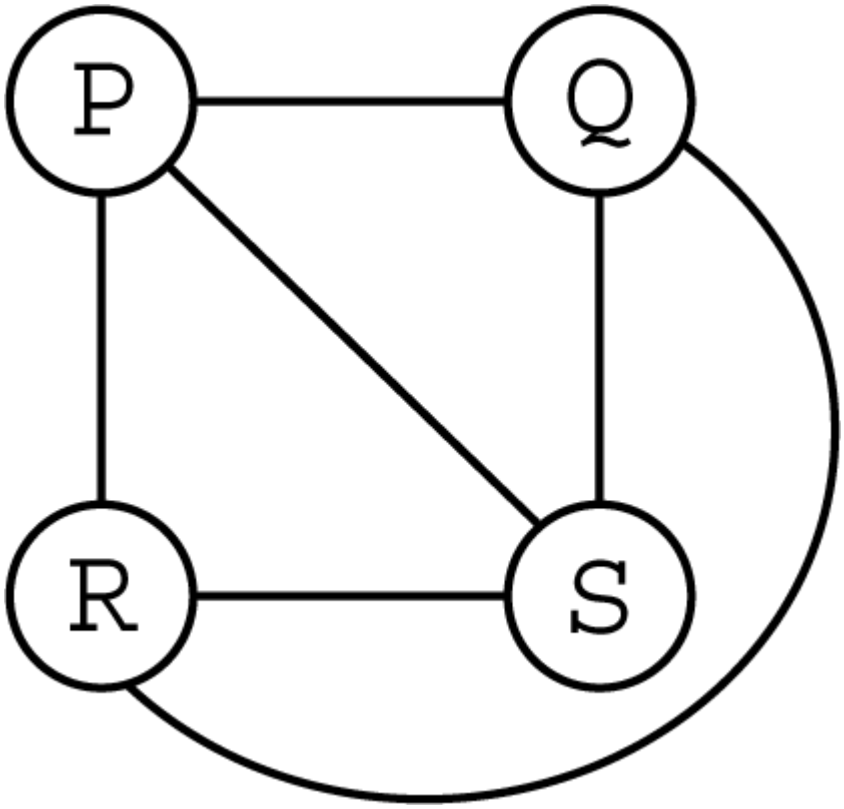
1. The following figure represents a network of physically linked devices labeled P through S. A line between two devices indicates a connection. Devices can communicate only through the connections shown.



Which of the following statements best explains the ability of the network to provide fault tolerance?

(A) The network is considered fault-tolerant because there are redundant paths between each pair of devices. ✓

(B) The network is considered fault-tolerant because it guarantees that no individual component will fail.

(C) The network is not considered fault-tolerant because it relies on physical connections.

(D) The network is not considered fault-tolerant because it provides more paths than are needed.

2. Which of the following best describes the ability of parallel computing solutions to improve efficiency?

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(A) Any problem that can be solved sequentially can be solved using a parallel solution in approximately half the time.

(B) Any solution can be broken down into smaller and smaller parallel portions, making the improvement in efficiency theoretically limitless as long as there are enough processors available.

(C) The efficiency of parallel computing solutions is rarely improved over the efficiency of sequential computing solutions.

(D) The efficiency of a solution that can be broken down into parallel portions is still limited by a sequential portion. ✓

3. According to the domain name system (DNS), which of the following is a subdomain of the domain *example.com*?

(A) *about.example.com* ✓

(B) *example.co.uk*

(C) *example.com.org*

(D) *example.org*

4. For which of the following situations would it be best to use a heuristic in order to find a solution that runs in a reasonable amount of time?

(A) Appending a value to a list of n elements, which requires no list elements be examined.

(B) Finding the fastest route that visits every location among n locations, which requires $n!$ possible routes be examined. ✓

(C) Performing a binary search for a score in a sorted list of n scores, which requires that fewer than n scores be examined.

(D) Performing a linear search for a name in an unsorted database of n people, which requires that up to n entries be examined.

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5. Which of the following are benefits of procedural abstraction?

Select two answers.

(A) Procedural abstraction prevents programmers from accidentally using the intellectual property of other programmers.

(B) Procedural abstraction eliminates the need for programmers to document their code.

(C) Procedural abstraction makes it easier for people to read computer programs. ✓

(D) Procedural abstraction provides an opportunity to give a name to a block of code that describes the purpose of the code block. ✓

6. A sorted list of numbers contains 500 elements. Which of the following is closest to the maximum number of list elements that will be examined when performing a binary search for a value in the list?

(A) 10 ✓

(B) 50

(C) 250

(D) 500

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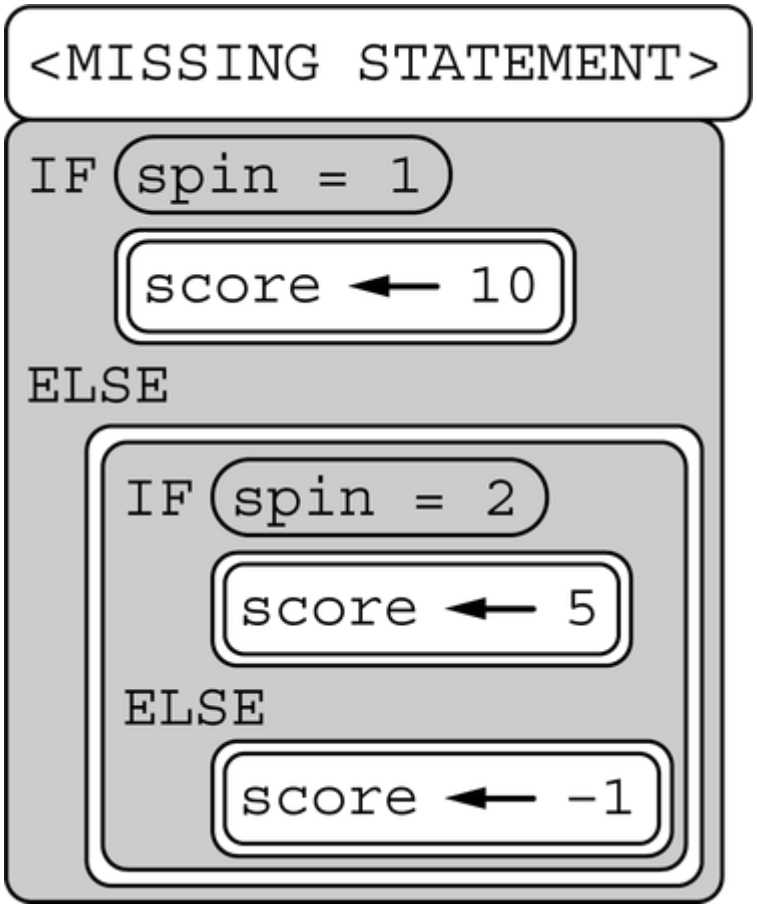
7. Consider a game where a player spins a wheel divided into four identical sections, labeled A, B, C, and D. If the player spins A, the score is `10`. If the player spins B, the score is `5`. If the player spins C or D, the score is `-1`.

The following code segment is intended to implement the game.



Which of the following could be used as a replacement for `<MISSING STATEMENT>` so the code segment works as intended?

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(A) 

(B)  ✓

(C) 

(D) 

8. A city planner is using simulation software to study crowd flow out of a large arena after an event has ended. The arena is located in an urban city. Which of the following best describes a limitation of using a simulation for this purpose?

(A) The model used by the simulation software cannot be modified once the simulation has been used.

(B) The model used by the simulation software often omits details so that it is easier to implement. ✓

(C) Running a simulation requires more time to generate data from trials than observing the crowd exiting the arena at various events.

(D) Running a simulation requires a large number of observations to be collected before it can be used to explore a problem.

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9. The procedure *Draw (length, direction)* is used to draw a line segment *length* units long in a given *direction* (left, right, up, or down), starting at the current cursor position. The cursor is then repositioned at the end of the line segment that was drawn. Consider the following program, where the cursor starts in the upper left corner of a grid of dots. The dots are spaced one unit apart.

```
Draw (1, right)
Draw (2, down)
Draw (1, left)
Draw (1, right)
Draw (1, up)
Draw (1, left)
```

Which of the following represents the figure that is drawn by the program?

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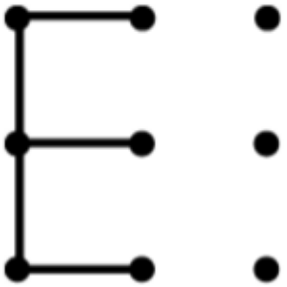
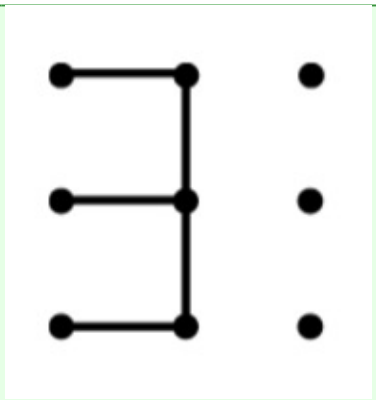
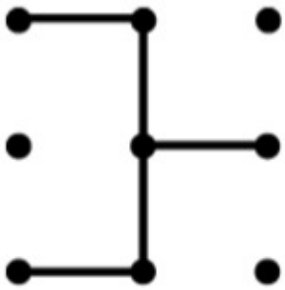
A



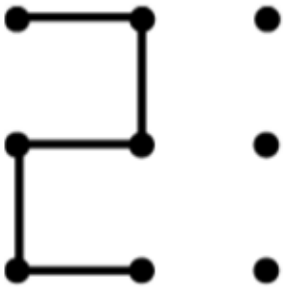
B



C



D



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10. Which of the following best explains how messages are typically transmitted over the Internet?

(A) The message is broken into packets that are transmitted in a specified order. Each packet must be received in the order it was sent for the message to be correctly reassembled by the recipient's device.

(B) The message is broken into packets. The packets can be received in any order and still be reassembled by the recipient's device. ✓

(C) The message is broken into two packets. One packet contains the data to be transmitted and the other packet contains metadata for routing the data to the recipient's device.

(D) The message is transmitted as a single file and received in whole by the recipient's device.

11. Which of the following is a primary reason for the use of open protocols on the Internet?

(A) Open protocols allow devices to specify how data packets are to be routed on the Internet in advance.

(B) Open protocols ensure that all data transmission on the Internet is kept secure.

(C) Open protocols ensure that all Internet users are provided connections with equal bandwidth.

(D) Open protocols provide a way to standardize data transmission between different devices. ✓

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12.

Directions: For the question or incomplete statement below, two of the suggested answers are correct. For this question, you must select both correct choices to earn credit. No partial credit will be earned if only one correct choice is selected. Select the two that are best in each case.

In a certain district, 20 percent of the voters are expected to vote for Candidate A in an election. The computer program below is intended to simulate the result of the election with `n` voters, and display the number of votes received by Candidate A.

```
Line 1:  sum ← 0
Line 2:  REPEAT n TIMES
Line 3:  {
Line 4:     IF (<MISSING CONDITION>)
Line 5:     {
Line 6:        sum ← sum + 1
Line 7:     }
Line 8:  }
Line 9:  DISPLAY (sum)
```

Which of the following can be used to replace `<MISSING CONDITION>` in line 4 so that the program works as intended?

Select <u>two</u> answers.

(A) `RANDOM (1, 5) = 1` ✓

(B) `RANDOM (1, 5) ≤ 2`

(C) `RANDOM (1, 10) = 2`

(D) `RANDOM (1, 10) ≤ 2` ✓

13. Two computers are built by different manufacturers. One is running a Web server and the other is running a Web browser. Which of the following best describes the ability of the two computers to communicate with each other across the Internet?

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(A) The computers cannot communicate because different manufacturers use different communication protocols.

(B) The computers can communicate, but additional hardware is needed to convert data packets from one computer's protocol to the other computer's protocol.

(C) The computers can communicate directly only if the messages consist of text; other formats cannot be interpreted across computers.

(D) The computers can communicate directly because Internet communication uses standard protocols. ✓

14. A user enters a Web address in a browser, and a request for a file is sent to a Web server. Which of the following best describes how the file is sent to the user?

(A) The file is broken into packets for transmission. The packets must be reassembled upon receipt. ✓

(B) The file is broken into packets for transmission. The user's browser must request each packet in order until all packets are received.

(C) The server attempts to connect directly to the user's computer. If the connection is successful, the entire file is sent. If the connection is unsuccessful, an error message is sent to the user.

(D) The server repeatedly attempts to connect directly to the user's computer until a connection is made. Once the connection is made, the entire file is sent.