Practice Test 1

Time: 120 minutes
70 questions

DIRECTIONS: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case and then fill in the appropriate letter in the corresponding space on the answer sheet.

1. Consider the following code.

```
num ← 1
REPEAT UNTIL num > 10
    IF num MOD 3 = 0
        DISPLAY num
    num ← num + 2
```

What is displayed because of executing the code segment?

(A) 1 3 5 7 9
(B) 1 5 7
(C) 3 9
(D) 9

2. Consider the following code segment.

```
petList ← "Dog"
APPEND petList, "Cat"
APPEND petList, "Fish"
INSERT petList, 2, "Golden Bandicoot"
REMOVE petList, 1
FOR EACH item IN petList
    DISPLAY item
```

What is displayed as a result of executing the code segment?

(A) Dog Cat Fish Golden Bandicoot
(B) Dog Cat Fish
(C) Dog Golden Bandicoot Cat Fish
(D) Golden Bandicoot Cat Fish

3. Students at a high school receive letter grades based on the following scale:

Score	Letter Grade
90 or above	A
Between 80 and 89 inclusive	B
Between 70 and 79 inclusive	C
Below 70	D

Which of the following code segments will display the correct letter grade for a given score?

I.
```
IF( score ≥ 90)
{
    DISPLAY ( "A")
}
IF ( score ≥ 80 AND score ≤ 89)
{
    DISPLAY ( "B")
}
IF ( score ≥ 70 AND score ≤ 79)
{
    DISPLAY ( "C")
}
```

```
IF( score < 70)
{
     DISPLAY ( "D")
}
```

II.
```
IF( score ≥ 90)
{
     DISPLAY ( "A")
}
ELSE
{
   IF ( score ≥ 80 AND score ≤ 89)
   {
        DISPLAY ( "B")
   }
   ELSE
   {
     IF ( score ≥ 70 AND score ≤ 79)
     {
          DISPLAY ( "C")
     }
     ELSE
     {
          DISPLAY ( "D")
     }
   }
}
```

III.
```
IF( score ≥ 90)
{
     DISPLAY ( "A")
}
IF ( score ≥ 80 AND ≤ 89)
{
     DISPLAY ( "B")
}
IF ( score ≥ 70 AND ≤ 79)
{
     DISPLAY ( "C")
}
IF( score < 70)
{
     DISPLAY ( "D")
}
```

(A) I only
(B) III only
(C) I and II only
(D) I, II, and III

4. Colors can be represented by decimal values from 0 to 255. If each pixel in a photo is a combination of three color values, what is the minimum number of bits needed to store a single pixel?

   (A) 512
   (B) 256
   (C) 24
   (D) 8

5. Which of the following is a true statement about data transmitted over the internet?

   (A) All data traveling over the internet is binary.
   (B) Packets are received in the same order that they are sent.
   (C) Redundancy in the design of the internet is overseen by large companies that set the standards used.
   (D) The domain name system (DNS) has been challenged by the Digital Millennium Copyright Act (DMCA).

6. What will the following code segment display?

```
nums ← [1, 4, 7, 10, 13]
count ← 1
REPEAT LENGTH [nums] TIMES
    DISPLAY [nums [LENGTH [nums] - count]]
    [count ← count + 1]
```

   (A) 1 4 7 10 9
   (B) 10
   (C) 9 10 7 4 1
   (D) Nothing will be displayed due to the error index out of bounds.

7. What should replace <missing condition> so that the program below displays TRUE 60% of the time?

```
x ← RANDOM(5, 14)
IF (<missing condition>)
    DISPLAY("TRUE")
ELSE
    DISPLAY("FALSE")
```

(A) $x < 6$
(B) $x \geq 6$
(C) $x > 10$
(D) $x \leq 10$

8. What percentage of the time will the program display an even number?

```
Line 1: num ← RANDOM(1,10)
Line 2: IF(num < 5 AND num MOD 2 = 0)
Line 3: {
Line4:     DISPLAY(num)
Line 5: }
```

(A) 10%
(B) 20%
(C) 40%
(D) 50%

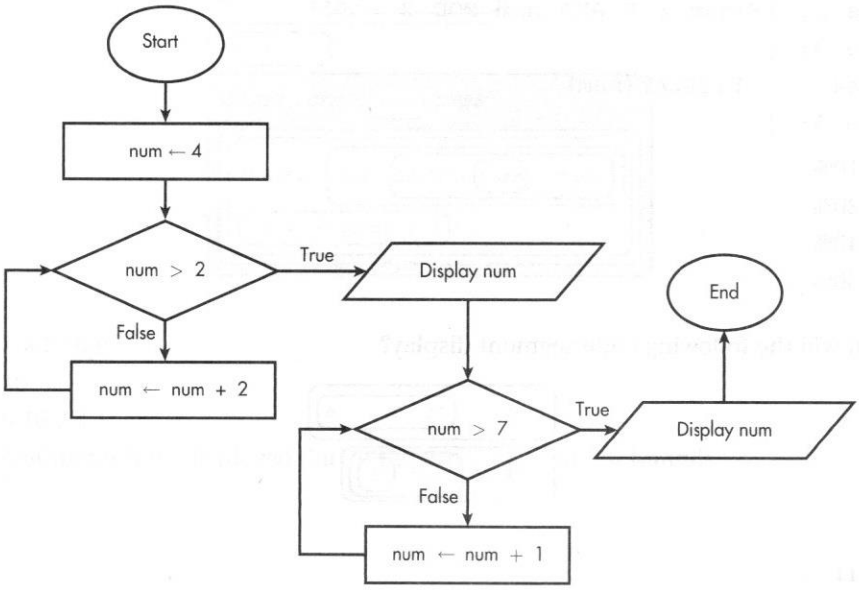
9. What will the following code segment display?

```
list1 ← (11, 3, 5, 6)
DISPLAY(list1(2))
```

(A) 11
(B) 6
(C) 3
(D) Nothing will be displayed due to an error.

10. A flowchart is a way to represent an algorithm visually. The flowchart below uses the following building blocks.

Block	Explanation
Oval	The start or end of the algorithm
Rectangle	One or more processing steps, such as a statement that assigns a value to a variable
Diamond	A conditional or decision step, where execution proceeds to the side labeled `true` if the condition is true and to the side labeled `false` otherwise
Parallelogram	Display a message



What will the program above display?

(A) 2 8
(B) 4 8
(C) 2 7
(D) 3 7

11. When run in series, a program that checks pictures for puppies takes 4,000 seconds to check 100 pictures for puppies. When running the same program in parallel, they take 400 seconds to run. What is the speedup for the parallel solution?

(A) 1
(B) 10
(C) 100
(D) 1,000

12. Which of the following does **NOT** need to be considered when determining the credibility of a source?

(A) Author's reputation and credentials
(B) Use of persuasive techniques within the source
(C) Publisher's reputation and credentials
(D) Sponsorship of the article or publisher

13. The code segment below is intended to swap the variables *a* and *b* using a temporary variable, *temp*. What can replace <missing code> so the algorithm works as intended?

```
<missing code>
a ← b
b ← temp
```

(A) `temp ← a`
(B) `b ← a`
(C) `temp ← b`
(D) `b ← temp`

14. In 2018, the company Cambridge Analytica was found to have collected data regarding millions of Facebook users. This was done by utilizing a loophole in Facebook's data collection policy, where apps connected to Facebook could collect information on a person's friends without the friends' permission. Which of the following concepts does this demonstrate?

(A) If security-related protections are ignored, the curation of data by commercial groups can be exploited.
(B) If privacy-related protections are ignored, the curation of data by commercial groups can be exploited.
(C) If security-related protections are ignored, the curation of data by governmental programs can be exploited.
(D) If privacy-related protections are ignored, the curation of data by governmental programs can be exploited.

15. Consider the following code segment, which uses the variables *a*, *b*, and *c*.

$a \leftarrow 2$
$b \leftarrow a + a$
$c \leftarrow b + a$
$a \leftarrow c + a$
DISPLAY(*a*)
DISPLAY(*b*)
DISPLAY(*c*)

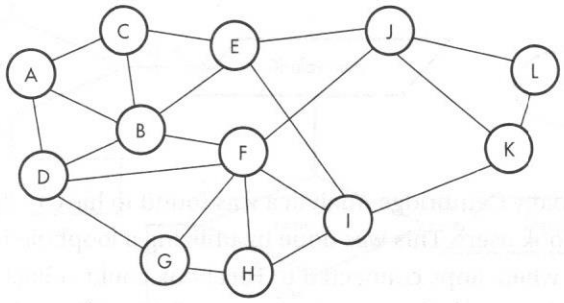
What is displayed by running the code segment?

(A) 3 3 6
(B) 8 4 6
(C) 11 3 8
(D) 3 11 3

16. Which best describes the role of TCP?

(A) The foundation of data communication for the World Wide Web
(B) The set of rules for the path packets taken on the fault-tolerant internet
(C) Setting the rules for a numerical label assigned to each device connected to the internet
(D) A common protocol for encrypting and decrypting data transferring on the internet

17. What is the minimum number of lines that must be cut to isolate F completely?



(A) 0
(B) 4
(C) 6
(D) 8

18. By switching from IPv4, which can store 2^{32} IP addresses, to IPv6, which can store 2^{128} IP addresses, how many more IP addresses will become available?

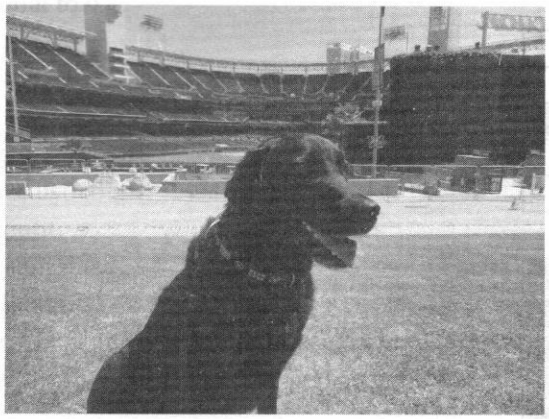
(A) Twice as many IP addresses
(B) 2^2 as many IP addresses
(C) 96 as many IP addresses
(D) 2^{96} as many addresses

19. The procedure below is intended to display the sum of all numbers in the list. Instead, it records an error when trying to display the total value contained in the list. What type of error did the procedure suffer from?

```
PROCEDURE getTotal (list)
  total ← 0
  FOR EACH item IN list
    total ← total + item
  PRINT (total)
```

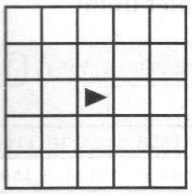
(A) Syntax error
(B) Logical error
(C) Runtime error
(D) No error; the program works as intended

20. Which of the following is **NOT** metadata for the picture?



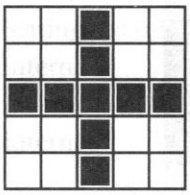
(A) The picture of the dog
(B) The location where the picture was taken
(C) The time the picture was taken
(D) The memory space taken up by the picture

21. What are the possible landing spaces for the robot after running the program segment shown below?

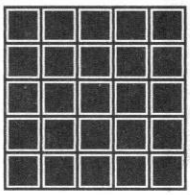


```
REPEAT (RANDOM(0,1))
{
    ROTATE_RIGHT()
}
REPEAT (RANDOM(0,2))
{
    MOVE_FORWARD()
}
```

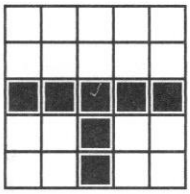
(A)



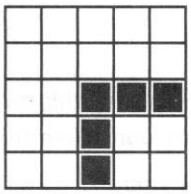
(B)



(C)



(D)



22. The two algorithms shown below, Algorithm A and Algorithm B, are intended to calculate average.

Algorithm A

Step 1: Set sum equal to 0.
    sum ← 0
Step 2: Set count = 1.
    count ← 1
Step 3: Add list[count] to sum.
    sum ← sum + list[count]
Step 4: Add 1 to count.
Step 5: Repeat steps 3 and 4 until count is equal to LENGTH(list).
Step 6: Set ave to sum divided by count.
    ave ← sum / count
Step 7: Return step 6.

Algorithm B

Step 1: Set sum equal to 0.
    sum ← 0
Step 2: Set count = 1.
    count ← 1
Step 3: Add list[count] to sum.
    sum ← sum + list[count]
Step 4: Add 1 to count.
Step 5: Set ave to sum divided by count.
    ave ← sum / count
Step 6: Repeat steps 3, 4, and 5 until count is equal to LENGTH(list).
Step 7: Return the last value calculated in step 5.

Which algorithm calculates average correctly?

(A) Algorithm A calculates average in all cases, while Algorithm B does not.
(B) Algorithm B calculates average in all cases, while Algorithm A does not.
(C) Neither Algorithm A nor Algorithm B calculates average correctly.
(D) Both Algorithm A and Algorithm calculate average correctly, but Algorithm A is more efficient.

23. Why does program code have to be run through a compiler?

(A) Program code is write-only until it is run through a compiler.
(B) Program code must be translated into a language the computer understands.
(C) Program code must be debugged by the compiler before it can ever run.
(D) It doesn't, as the new program could be run directly from the code.

24. The procedure findAverage is intended to return the average number in the list numbers. The procedure does not work as intended for all test cases.

```
PROCEDURE findAverage (numbers)
  (sum ← numbers [1])
  FOR EACH number IN numbers
    (sum ← sum + numbers [number])
  RETURN (sum / LENGTH [numbers])
```

Which of the following test cases will return the correct average using the above procedure?

(A) numbers[1, 1, 35, 6]
(B) numbers[0, 1, 35, 6]
(C) numbers[11, 35, 6]
(D) numbers[3, 5, 11, 6]

25. Which of the following is **NOT** an example of using citizen science as a possible solution?

(A) The behavior of fireflies during the summer months
(B) The behavior of the mysterious and wonderful jellyfish on the beach or water
(C) Collecting recordings using ultrasonic microphones and sonograms of bats
(D) Calculating PSAT scores for a school district

Questions 26–28 refer to the information below.

A web browser is selling its information cookies to third-party marketing companies. These companies are profiling users and selling the sorted data to targeted advertisers.

The web browser is debating adding a setting called Do Not Track. Once enabled, this setting would send a Do Not Track signal to the websites you visit, informing them that you do not give them permission to collect or share your personal information for behavioral advertising, price discrimination, or for any other purpose.

This setting would stop data brokers from legally selling your personal information from the sites you visit.

26. Which of the following is the most likely data privacy concern for the original browser?

(A) Information collected about your personal preferences and private activities might be used to brand you as members of a particular group.
(B) Cookies are used to acquire users' private encryption keys.
(C) Cookies are text files that keep track of such things as website visits and activity on that website.
(D) Cookies are responsible for spam and create pop-up advertisements.

27. Which of the following is least likely to receive targeted advertisements?

(A) Individuals using the web browser without the Do Not Track option
(B) Users who visit only websites with a digital certificate that block targeted advertisements
(C) Users with strong passwords and multifactor authentication
(D) Individuals using the web browser with the Do Not Track setting engaged

28. Which of the following potential benefits is **MOST** likely to be provided by the upgraded system?

(A) Weather websites customizing site information based on the user's location without having the user enter the city every visit
(B) Increasing the speed in ordering pizza online because the pizza webpage remembers the user's address and credit card information
(C) Limiting the information about the sites and stores that the user visits
(D) Offering products and services that are more relevant to the user

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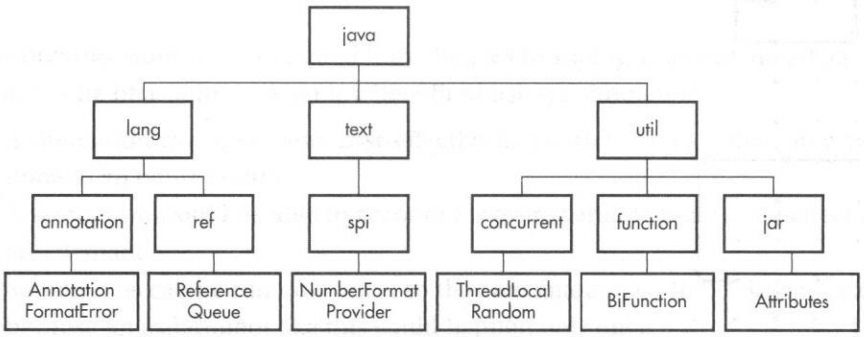
29. In the computing language JAVA, the programmer can add a support library using the `import` command, which is followed by the full path to the support class. The path is ordered from the most abstract class to the least and does not skip any level.



Suppose that the programmer wants to access the class `ThreadLocalRandom`. Using the partial hierarchy shown above, which of the following commands would properly import `ThreadLocalRandom`?

(A) `import java.util.concurrent.ThreadLocalRandom`
(B) `import ThreadLocalRandom.concurrent.util.java`
(C) `import java.ThreadLocalRandom`
(D) `import java.util.function.ThreadLocalRandom`

30. Convert 88_{DEC} to a binary number.

(A) 1111000_{BIN}
(B) 1011000_{BIN}
(C) 1010101_{BIN}
(D) 1000001_{BIN}

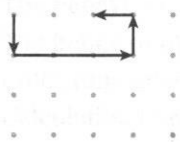
31. Assume a particular system stores text by connecting 8-bit sequences. Each character in a string is one sequence, with the number used corresponding to its place in the alphabet (thus, *a* would be `00000001`, *b* would be `000000010`, *c* would be `000000011`, and so on). In this system, what would be the binary representation of the word *dog*?

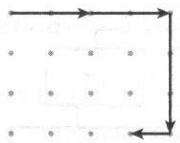
(A) `00000111 00001111 00000100`
(B) `00000100 00001111 00000111`
(C) `00000100 00001001 00000111`
(D) `00000010 00001111 00000111`

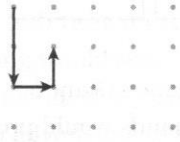
32. The abstraction Draw(magnitude, direction) is used to draw line segments at a given magnitude and direction (north, south, east, or west) starting at the tip of the first vector to the tail of the second vector. Consider the following program, where the vector starts in the upper-left corner of a grid of dots.

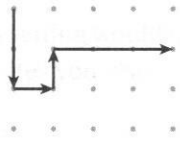
```
Draw(2,east)
Draw(2,east)
Draw(3,south)
Draw(1,west)
```

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

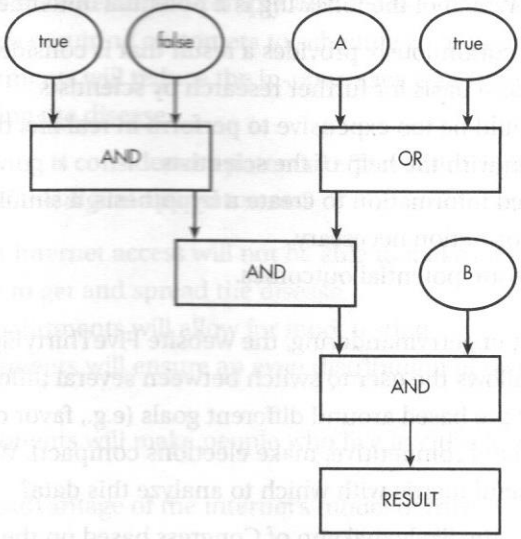
(A)


(B)


(C)


(D)


33. In the following flowchart, what is the value of RESULT?



(A) True when both A and B are true
(B) True when either A or B are true
(C) Always true
(D) Always false

34. An economist wants to understand how changes in supply and demand affect the inflation rate of a country. What is a benefit of using a simulation?

(A) A simulation would be more cost-effective and easier to create than an experiment done to an entire country.
(B) A simulation would be able to account for every variable that would affect supply and demand.
(C) Simulations can be run only once, so they are guaranteed to be close to real life because an experiment like this could happen only once.
(D) Simulations have as much of an effect on the real world as an actual experiment of this scale would.

35. Which of the following is true about data compression?

(A) Data compression can be used for pictures and video only.
(B) Lossless data compression is the best compression under all conditions.
(C) Data compression can be used to reduce the size of a file for storage or transmission.
(D) Lossy compression cannot be used when sending pictures.

36. A programmer is writing a program that is intended to be able to process large amounts of data in a reasonable amount of time. Which of the following considerations is likely to affect the ability of the program to process large data sets?

(A) The amount of program documentation that should be minimized
(B) The order of the data put into the data set
(C) How much memory the program requires to run
(D) How many program statements the program contains

37. A certain company collaborates with scientists by creating and testing simulations for scientific research. Which of the following is a potential outcome of this?
    (A) If a simulation continuously provides a result that is considered abnormal, this could be used as a basis for further research by scientists.
    (B) If a concept would be too expensive to perform in real life, the company could create a simulation with the help of the scientists.
    (C) If scientists need information to create a hypothesis, a simulation can be used to provide the information necessary.
    (D) All of the above are potential outcomes.

38. To show the impact of gerrymandering, the website FiveThirtyEight created an interactive webpage that allows the user to switch between several different maps of congressional districts that are based around different goals (e.g., favor one of the major parties, make elections competitive, make elections compact). Which of the following would **NOT** be a useful metric with which to analyze this data?
    (A) Overall results—the likely makeup of Congress based on the likely winner of each district; (some seats are listed as "competitive")
    (B) County splits—the number of times that a county is divided into multiple districts
    (C) Racial makeup—the number of districts that are a majority of a certain race (or have no majority)
    (D) Third-party wins—the number of districts that would likely be won by an independent or third-party candidate

39. Why does updating a file require more memory than reading a file?
    (A) A read file needs only certain parts loaded to memory, but an updating file requires the entire file to be in memory.
    (B) A read file requires no memory, so the updating file would always require more memory.
    (C) A read file requires the entire file be loaded to memory, but an updating file requires both the original version and the updated version be in memory.
    (D) A read file uses only the hard disk, while an updating file requires both the hard disk and the RAM.

40. Why do computing innovations tend to lead to legal concerns?
    (A) Lawyers are unfamiliar with the laws governing computing innovations because these laws involve multiple states.
    (B) Laws about the internet concerning copyrights have been passed, but the speed of innovations has made these laws harder to enforce.
    (C) Laws involved in these concerns were often created before the advent of computers, meaning that these laws may not cover certain aspects of new technology.
    (D) There is no way to hide your IP address on the internet, so laws are easily enforced.

41. To stop the spread of a contagious disease, social distancing of 6 feet is recommended. To test a person for the disease and comply with the 6-foot distancing recommendation, pharmacies are requiring customers to schedule an appointment online for the test. These appointments will reduce the in-pharmacy wait time during which people are at risk of catching the disease.

Which of the following is considered a potential effect of the digital appointments rather than the purpose of the digital appointments?

(A) People without internet access will not be able to make an appointment and thus are more likely to get and spread the disease.
(B) The digital appointments will allow for more testing.
(C) Digital appointments will ensure an even distribution of tests on both sides of the digital divide.
(D) Digital appointments will make people who live in cities less likely to get tested.

42. What is a major disadvantage of the internet's model of trust?

(A) A trusted website can have a large amount of power over a computer, so improper trusts can be very damaging if the website is malicious.
(B) A trusted website has power over the computer's ROM, which could be very damaging if the website is malicious.
(C) A trusted website cannot have encrypted communications, which means any data sent can be read by an interceptor.
(D) A trusted website can still download malicious code even if it is blocked by a firewall.

43. The design of a program incorporates investigations to determine its requirements. Most programs are designed to be used by people other than the programmers. To meet the needs of the users, the investigation must identify the program constraints as well as the concerns and interests of the people who will use the program.

Which of the following is **NOT** an investigation tool for designing programs?

(A) Programming the most elegant code
(B) Collecting data through surveys
(C) User testing
(D) Direct observations.

44. The Caesar cipher is an encryption technique. It is a substitution cipher that replaces a letter with a different letter a fixed number of positions down the alphabet. For example, a shift of 3 would cause the word "cat" to be translated to "fdw." The Caesar cipher is an example of what type of encryption?

(A) Home key encryption
(B) Public key encryption
(C) Symmetric encryption
(D) No key encryption

45. What is the purpose of a digital certificate in secured communications?

(A) A digital certificate ensures that the communication system has been examined by a third party.

(B) A digital certificate ensures that the server's own security features have been examined by a third party, are using public key encryption, and are ensuring that the transactions are being kept confidential.

(C) A digital certificate ensures that the server contacted in the secure connection is the actual server and not a copycat.

(D) A digital certificate ensures that the website's code has been created by a professional programmer.

46. Which of the following illustrate ways that the internet facilitates collaboration?

I. People can communicate more quickly, enabling teams to work together regardless of distance.

II. Online technologies, such as messaging and file transfers, make it easier to send visuals that can be pertinent for projects.

III. File-sharing protocols enable documents to be saved in the cloud and edited by all team members.

(A) I only

(B) I and III only

(C) II and III only

(D) I, II, and III

47. A web browser contacts a server using IPv4 and pages a request for a website's address. Which of the following could **NOT** be a potential response?

(A) 92.11.198.113

(B) 174.260.45.144

(C) 128.198.232.65

(D) 54.116.188.246

48. Which of the following types of components is necessary for cybersecurity?

I. Software

II. Hardware

III. Human

(A) I only

(B) III only

(C) I and II only

(D) I, II, and III

49. What is the maximum number of searches required if using a linear search on a list containing 2,000 numbers?

(A) 2,000
(B) 1,000
(C) 11
(D) 1

50. The procedure isFound(list, item) will return TRUE if an item is found in a list. What will the following procedure display?

```
list1 ← 1, 35, 6, 76, −4, 98
list2 ← 5, 1, 8, 6, 96, −4
list3 ← _
DISPLAY mystery list1, list2, list3

PROCEDURE mystery list1, list2, list3
  FOR EACH item in list1
    IF isFound list2, item
      APPEND list3, item
  RETURN list3
```

(A) [ ]
(B) [1, 6, −4]
(C) [4, 6, −4]
(D) [1, 35, 6, 76, 4, 98, 5, 1, 8, 96, −4]

51. What is the value of sum displayed after this algorithm is run?

```
list1 ← 85, 40, 79, 80, 92, 20
sum ← 0
FOR EACH item IN list1
  IF item MOD 2 = 0
    sum ← sum + 1
DISPLAY sum
```

(A) 0
(B) 4
(C) 6
(D) Error

52. What will the following program display?

```
x ← 3
y ← 2
DISPLAY mystery x, y
PROCEDURE mystery x, y
    REPEAT UNTIL x = 0
        DISPLAY "O"
        x ← x − 1
    REPEAT UNTIL y = 0
        DISPLAY "X"
        y ← y − 1
```

(A) OXXOXXOXX
(B) OXXOO
(C) OOOOXXX
(D) The program is an infinite loop.

53. What will be the result of the displayed program?

```
list1 ← 6, 9, 14, 5, 7
num ← 5
REPEAT UNTIL num < 1
    IF list1 num MOD 2 = 1
        DISPLAY list1 num
    num ← num − 1
```

(A) 9 5 7
(B) 6 14
(C) 14 6
(D) 7 5 9

54. What will be the output of the following program?

```
list1 ← 6, 9, 14, 5, 7
num ← 5
REPEAT UNTIL num < 1
    IF list1 num MOD 2 = 0
        DISPLAY list1 num
    num ← num − 1
```

(A) 9 5 7
(B) 14 6
(C) 14
(D) 7 5 9

55. Consider the following code segment.

```
num ← 3
REPEAT UNTIL num > 12
    IF num MOD 2 = 0
        DISPLAY num
    num ← num + 1
```

What will the executed code display?

(A) All odd numbers between 3 and 12
(B) All even numbers between 1 and 12
(C) All even numbers between 3 and 12
(D) All odd numbers between 1 and 12

56. What should replace <missing condition> so the program below displays TRUE 60% of the time?

```
x ← RANDOM 5, 9
IF <missing condition>
    DISPLAY "TRUE"
ELSE
    DISPLAY "FALSE"
```

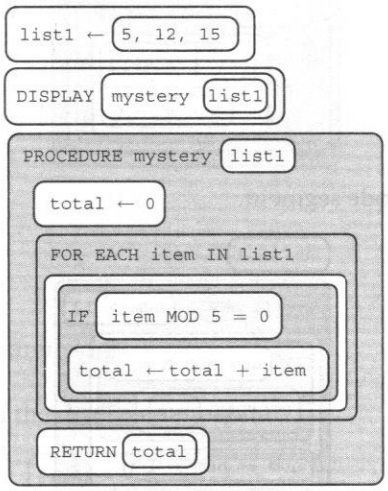
(A) x MOD 2 = 0
(B) x MOD 5 = 0
(C) x MOD 2 = 1
(D) x MOD 5 = 5

57. What percentage of the time will the following program display a number?

```
num ← RANDOM(1,20)
IF(num > 5 AND num < 13 AND num MOD 2 = 0)
{
   DISPLAY(num)
}
```

(A) 10%
(B) 20%
(C) 25%
(D) 75%

58. What is the following program displaying?



(A) 37
(B) 27
(C) 25
(D) 20

59. What is the code below displaying?

```
Line 1: x ← 2
Line 2: y ← 0
Line 3: WHILE(y < 15 AND y MOD 3 = 1)
Line 4: {
Line 5: DISPLAY(y)
Line 6: y ← y + 1
Line 7: }
```

(A) 0
(B) 2, 4, 6, 8, 10, 12, 14
(C) 3, 6, 9, 12
(D) 3, 6, 9, 12, 15

60. What is the code segment displaying?

```
c ← 17
x ← 4
x ← 14 MOD 2
c ← c * x
DISPLAY c
```

(A) 68
(B) 34
(C) 17
(D) 0

61. What does the algorithm display?

```
a ← 4 MOD 3 + 7 MOD 2 * 3
DISPLAY a
```

(A) 3
(B) 4
(C) 5
(D) 7

62. A certain computer has two identical processors that can run in parallel. Each processor can run only one process at a time, and each process must be executed on a single processor. In this problem, processes four and five must be run in series while processes one, two, and three can all run in parallel. The following table indicates the amount of time it takes to execute a particular process on a single processor. Assume none of the processes are dependent on any other process.

Process	Execution time (seconds)
One	3
Two	3
Three	5
Four	2
Five	5

Which of the following best approximates the minimum possible time to run all five processes?

(A) 5 seconds
(B) 9 seconds
(C) 13 seconds
(D) 18 seconds

63. What will *y* display?

```
x ← 7
y ← 8
temp ← x + y
x ← y
y ← x
temp ← x + y
y ← temp + 4
DISPLAY (y)
```

(A) 0
(B) 15
(C) 16
(D) 20

64. A certain computer has a single central processing unit. The following table indicates the amount of time it takes to execute a single process. Assume none of the processes are dependent on any other process.

Process	Execution time (seconds)
One	15
Two	4
Three	9

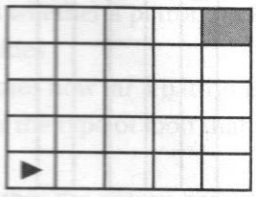
Which of the following best approximates the minimum possible time to run all three processes in series?

(A) 28 seconds
(B) 15 seconds
(C) 9 seconds
(D) 4 seconds

65. Why is it more effective to put procedures in a program than to repeat code? **Select two answers.**

(A) Procedures make a program harder to edit because every extraction is saved on a distinct file.
(B) Procedures simplify editing by requiring only one edit to the abstraction rather than to every instance of the code.
(C) Using procedures takes up less space than repeating code, which makes the program easier to read.
(D) Procedures are guaranteed to work in every instance they are used if they work once.

66. The following question uses a robot in a grid of squares. The robot is represented by a triangle, which is initially facing right. Which code can replace <missing code> to have the robot end up in the gray square? **Select two answers.**



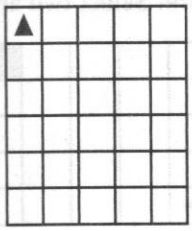
```
PROCEDURE zigzag (x)
  x ← 4
  <missing code>
    MOVE_FORWARD
    ROTATE_LEFT
    MOVE_FORWARD
    ROTATE_RIGHT
```

(A) REPEAT UNTIL $x = 4$
(B) REPEAT 4 TIMES
(C) FOR EACH item IN list
(D) REPEAT UNTIL (Goal_Reached)

67. The findings from a project are typically presented using a graph as opposed to a table or raw data. Why might this be? **Select two answers.**

(A) Graphs can be easily placed into a slideshow or document, while tables cannot.
(B) Graphs can show trends that might not be easily seen with raw data.
(C) Graphs are able to show all of the detail necessary to understand data.
(D) Graphs are easier to read and interpret at a glance.

68. The question below uses a robot in a grid of squares. The robot is represented by the triangle, which is initially in the top-left square of the grid and facing toward the top of the grid.

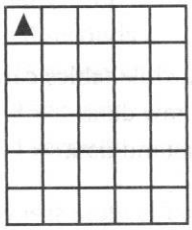


Code for the procedure Mystery is shown below. Assume that the parameter *p* has been assigned a positive integer value (e.g., 1, 2, 3, . . .).

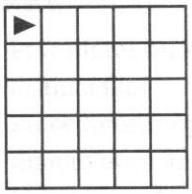
```
ROTATE_RIGHT ( _ )

PROCEDURE mystery ( p )
  REPEAT p TIMES
    MOVE_FORWARD ( _ )
    ROTATE_RIGHT ( _ )
    MOVE_FORWARD ( _ )
    MOVE_FORWARD ( _ )
```

Which of the following shows possible results of running the code segment with any value of $p \geq 0$ AND $p < 2$? **Select two answers.**

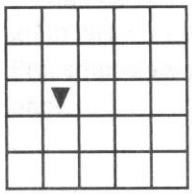
(A)



(B)



(C)



(D) Error. The robot leaves the grid.

69. A theme park wants to create a simulation to determine how long it should expect the wait time to be at its most popular ride. Which of the following characteristics for the virtual patrons would be most useful? **Select two answers.**

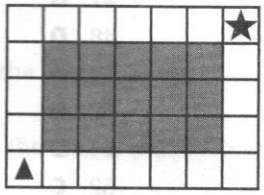
(A) Ride preference—denotes whether a patron prefers roller coasters, other thrill rides, gentle rides, or no rides

(B) Walking preference—denotes how far a patron is willing to walk in between rides

(C) Food preference—denotes the type of food that a patron prefers to eat (e.g., chicken, burgers, salads)

(D) Ticket type—denotes whether the patron has a single-day pass, a multiday pass, or an annual pass

70. A robot is shown in the lower-left corner of a grid and is pointing up.



```
Line 1: PROCEDURE moveAndSpin (x, y)
Line 2: {
Line 3: REPEAT x TIMES
Line 4: {
Line 5: MOVE_FORWARD()
Line 6: }
Line 7: REPEAT y TIMES
Line 8: {
Line 9: ROTATE_RIGHT ()
Line 10:}
```

What procedure will result in the robot landing on the star?

(A) moveAndSpin(4, 1)
moveAndSpin(6, 0)

(B) moveAndSpin(0, 1)
moveAndSpin(6, 3)
moveAndSpin(4, 0)

(C) moveAndSpin(7, 3)

(D) moveAndSpin(0, 7)