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## AP Computer Science Principles Practice Exam 2

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### Multiple-Choice Questions

Time: 2 hours

Number of questions: 70

The multiple-choice questions represent 70% of your total score.

Directions: Choose the one best answer for each question. The last eight questions of the test have two correct answers; for these, you will be instructed to choose two answer choices.

Tear out the answer sheet on the previous page and grid in your answers using a pencil. Consider how much time you have left before spending too much time on any one problem.

#### AP Computer Science Principles Exam Reference Sheet

On the AP Computer Science Principles Exam, you will be given a reference sheet to use while you're taking the multiple-choice test. A copy of this six-page reference sheet is included in the Appendix of this book (reprinted by permission from the College Board).

To make taking this practice test like taking the actual exam, you should tear out the reference sheet so you can easily refer to it while taking the test. Save these reference pages since you'll need to use them when you take AP Computer Science Principles Practice Exam 1.

If you tore out the pages earlier and have lost them, the reference sheet is also available near the end of the PDF publication "AP Computer Science Principles Student Handouts" on the College Board website. Here is the URL:

<https://apcentral.collegeboard.org/pdf/ap-csp-student-task-directions.pdf?course=ap-computer-science-principles>

1. When running a program that counts the number of records in a large dataset, you receive an error on your computer screen, in binary format: 11110001.

Convert the error message from binary to decimal to be able to look it up.

- (A) 239—Invalid operation. Corrupt data caused the error.
  - (B) 240—Decimal numbers are stored imprecisely in computers. A rounding error occurred.
  - (C) 241—Overflow error. The object exceeded its maximum size. The dataset is too large to run on your computer.
  - (D) 404—Error message not found.
2. You read in the news about an employee who took advantage of decimal numbers used with currency exchanges to steal money. What is the most likely way the employee accomplished this?

- (A) The employee redirected the overflow amount when it occurred and deposited it in his account.
- (B) The employee took advantage of rounding and deposited the fractional amounts.
- (C) The amount is represented in binary and when the right-most bit was a 1, he replaced it with a 0 and deposited the difference.
- (D) The employee converted to Euros and then back to U.S. dollars. The difference in the exchange rate was deposited into his account.

3. Saving your information from an online form to be able to auto-fill fields in future forms captures some of your Personally Identifiable Information (PII). This could be an example of:

- (A) an ethical matter
- (B) a legal problem
- (C) a privacy concern
- (D) a security issue

4. What order should the following procedures be used in creating an app to reserve a study room in the library?

- checkAvail()—checks the availability of the time requested since multiple people can use the app at the same time
  - recordResv()—records the room reservation
  - requestTime()—asks for a reservation time for the study room
  - timesAvail()—displays the times the room is available
  - updateTimes()—updates the times available to be displayed
- (A) requestTime(), recordResv(), timesAvail(), checkAvail(), updateTimes()
  - (B) requestTime(), timesAvail(), recordResv(), updateTimes()
  - (C) timesAvail(), requestTime(), checkAvail(), recordResv(), updateTimes()
  - (D) requestTime(), recordResv(), updateTimes()

**Questions 5 and 6 are based on the code below. Assume the variables and list already have values.**

```

IF topSongs[i] = song AND song_Times_Played = 100
    REMOVE (topSongs, i)
ELSE
    play (song)
    song_Times_Played ← song_Times_Played + 1
  
```

5. What is the code doing?

- (A) Playing a song from the topSongs list
- (B) If a song is in topSongs, playing it, then removing it
- (C) Removing a song from topSongs if it has been played 100 times; otherwise playing the song and increasing the number of times played
- (D) This code will not run as written.

- 6.** In the above code, after a song has been deleted from the list once, it keeps being removed after the user adds it back to the list. What is the best way to fix this error?
- Change the program to allow songs to be played 1,000 times before being deleted.
  - Send the user a message to confirm they want to delete the song stating it can never be added back to the list.
  - Write a new procedure to add a song back to the list if it had been on the list previously.
  - Set `song.Times Played` back to 0 after removing a song.
- 7.** Which of the following will evaluate to false?
- `false AND (true OR NOT(false))`
  - `true AND (NOT(true AND false))`
  - `NOT (false OR (true OR false))`
- i and ii
  - ii and iii
  - i and iii
  - i, ii, and iii
- 8.** Which of the following will evaluate to true?
- `(true OR false) AND NOT(true OR NOT(false))`
  - `NOT (true AND (NOT(true OR false)))`
  - `(NOT(true) OR (true AND false))`
- i
  - ii
  - i and iii
  - ii and iii
- 9.** A group that is watching sea turtle nests records data about their nests. Which of the following is metadata?
- Daily temperature of the nest
  - Date the eggs were laid
  - Nest tag
  - Number of data fields tracked
- 10.** The video the nest watchers took of the baby sea turtles making their way to the water is too large to send. How can the volunteers compress the video to get it to the scientists in full resolution?
- Lossless compression will allow the scientists to see the video in full resolution.
  - Lossy compression will make the file small enough to send.
  - They should be combined for the best compression.
  - Any compression technique will be sufficient.
- 11.** When analyzing a list of potential employees for promotion that an algorithm produced, the team noticed that there were no members of a particular group included. With further research, it was determined that part of the criteria that the algorithm used included prior employees in that position, which had few from that particular group. What is this an example of?
- Bias
  - Citizen science
  - Single criteria elimination
  - Targeted data
- 12.** Which of the following techniques would be best to use to further analyze patterns that emerged during data mining?
- Classifying data to categorize it into distinct groups
  - Cleaning data to determine which data to include in the processing
  - Clustering data to separate data with similarities into subclasses
  - Filtering to set conditions so only records meeting the criteria are included
- i, ii, iii
  - i, iii, iv
  - i, ii, iv
  - i, ii, iii, iv

13. The data you are analyzing shows a surprising correlation between parking tickets and pizza orders. What should you do with this information?
- (A) Document the trend to share with management.
  - (B) Perform additional data collection from new sources to verify the correlation.
  - (C) Determine if the pizza order caused the parking ticket.
  - (D) Determine if the parking ticket caused the pizza order.
14. A good business practice is to send a copy of data off-site in the event of a catastrophic event such as a fire at the organization's primary server location. How can organizations keep their data secure while transmitting and storing in an off-site location?
- (A) They should encrypt their data using public key encryption.
  - (B) They should use a symmetric key encryption algorithm to protect their data.
  - (C) They should only send nonsensitive data off-site.
  - (D) They should make physical copies of their data and ship it to the off-site location weekly.
15. In putting together a team, the project manager wants to have members with different backgrounds, even if they are in nonrelated fields. What is the best reason for this idea?
- (A) Different experiences will help develop leaders on the team.
  - (B) There will be support for the project from all areas that have team members involved.
  - (C) The team members will ensure the project excels in their area of expertise.
  - (D) Different perspectives will help develop a better product.
16. What should an organization with extra computers and large amounts of data that they are unable to process consider?
- (A) Utilizing a distributed computing model
  - (B) Adding extra servers to their location to be available when needed
  - (C) Limiting the amount of data collected to balance the available processor speed
  - (D) Maintaining a sequential computing model
17. Which of the following will help organizations gain insights about their business?
- (A) Collecting and analyzing large amounts of data to identify patterns and trends they can use to their advantage
  - (B) Separating large amounts of data into smaller datasets and analyzing those for faster results
  - (C) Developing decryption data techniques to be able to drill down and analyze data the government posts online
  - (D) Creating copies of company data to let each division do their own analysis without impacting others
18. How does data streaming on the Internet work?
- (A) Data is sent along the shortest path to reduce buffering.
  - (B) Packets are created at the sender's end and reassembled at the receiver's end.
  - (C) It uses HTML to share documents among users when requested through their web browsers.
  - (D) It creates redundancy, so when part of the Internet is down, information can keep flowing.

- 19.** How do Internet packets travel to their destination?
- Router to router based on the Travelling Salesman algorithm
  - Along the same path to stay in order
  - Timed to arrive at the destination in their correct order
  - Along a variety of different paths
- 20.** What action does the Internet Protocol (IP) perform?
- It ensures packets can be transmitted across different equipment used with the Internet.
  - It enforces the Internet's rules for website names.
  - It classifies the data into clusters used for Internet traffic analysis.
  - It measures the latency on the Internet to determine the fastest path to send the data.
- 21.** You are writing code to count duplicates in an existing list. What code could replace <missing code> for the algorithm to work correctly? Assume all variables have been correctly initialized.
- ```

<listNums is a list of integers>
PROCEDURE countDups(listNums)
{
    index = 2
    numDuplicates = 0
    FOR EACH number in listNums
    {
        REPEAT UNTIL (index ≥
                      LENGTH(listNums))
        {
            IF (<missing code>)
            {
                numDuplicates ←
                    numDuplicates + 1
            }
            index ← index + 1
        }
    }
    RETURN numDuplicates
}

```
- listNums[index] > listNums[index-1]
  - listNums[index] < number
  - listNums[index] = number
  - listNums[index] = listNums[index + 1]
- 22.** What is bandwidth?
- The amount of data that can be transmitted in a specified amount of time
  - The speed that data can be downloaded
  - The size of the cable that connects homes and businesses to the Internet
  - The amount of delay between requesting data and receiving it
- 23.** How can consumers ensure that a website is not a phishing scam before making an Internet purchase?
- Go to the website directly rather than clicking a link from an e-mail.
  - Call the company directly.
  - Use antivirus software and keep it up-to-date.
  - Use a firewall to block malware.
- 24.** With regard to multifactor authentication methods, a security token texted to your cell phone is an example of which category?
- Knowledge
  - Possession
  - Inherence
  - All of the above
- 25.** Which of the following ensures you have a strong password?
- You can remember it without writing down
  - A string that includes special characters and uppercase and lowercase letters
  - It is at least 8 characters long
  - All of the above
- 26.** Why is the Internet designed to be fault-tolerant?
- So the system doesn't crash when people make typos in their web requests.
  - So the Internet can keep running even when it has malware
  - So it can keep running when sections of it are not working
  - So as companies expand to new locations, IP conflicts can be resolved

27. When analog data is converted to digital data,
- the data match exactly
  - the digital data is an approximation of the analog data
  - the analog data approximates the digital data
  - the digital data has more values than the analog data
28. While crowdsourcing is often used to fund projects, what is another use in practice today?
- Diagnosing medical conditions by asking if others have similar symptoms
  - Asking those who register with a company to evaluate new products
  - Lowering costs by using the crowd's computers during periods of activity
  - Matching people needing work with job openings
29. If data analysis identifies new patterns, what should a company do with the information?
- Further analyze the data pattern identified to make strategic decisions.
  - Change the prices on their products to match the findings for increased sales.
  - Get their products to market faster to increase their profit.
  - Use it to place targeted ads with people who are repeat customers.
30. What value will the following code display?  
Assume all values are correctly initialized.

*num* is a variable holding an integer value.

DISPLAY (num MOD 10)

- The value in the *ones* position
- The value in the *tens* position
- The current value in the variable *num*
- The quotient of *num* divided by 10

31. Which code segment will correctly add a name to a team roster?

Assume all variables and lists are appropriately initialized.

**Block 1**

```
x ← 1
REPEAT UNTIL (x <= 0)
{
    APPEND (roster, name)
    x ← x + 1
}
```

**Block 2**

```
FOR EACH name IN roster
{
    APPEND (roster, name)
    DISPLAY(name)
}
```

- Block 1
- Block 2
- Both Block 1 and Block 2
- Neither Block 1 or Block 2

32. Which algorithm will determine if a number is even?

(A) num ← INPUT()
IF (num MOD 2 = 0)
{
 DISPLAY (num, " is even")
}

- (B) Assume list is initialized with integers.

```
FOR Each num IN list
{
    IF (num / 2 = 0)
    {
        DISPLAY (num, " is even")
    }
}
```

(C) num ← INPUT()
IF ((num / 2) \* num = num)
{
 DISPLAY (num, " is even")
}

(D) num ← INPUT()
IF (NOT (num MOD 2 = 0))
{
 DISPLAY( num, " is even")
}

**33.** Why is a binary search the most effective way to search a sorted dataset?

- (A) The item searched for bubbles to the beginning of the dataset after one pass.
- (B) It uses machine learning with each pass of the data to learn where the data is located in the file.
- (C) It eliminates half the dataset with each iteration of the search.
- (D) It merges sections of data to only have to search one section with each iteration.

**Questions 34–38 are related to the reading passage and flowchart.**

To help people who are expecting a package to be delivered while they are away from home, a new “open it yourself” app is being developed. The purpose is to give certain people and/or organizations a special code to key in to open and close your door.

Here is a chart with basic information:

| Input                               | Processes            | Output                                  | API needed                              | Average delivery time with app | Average delivery time without app |
|-------------------------------------|----------------------|-----------------------------------------|-----------------------------------------|--------------------------------|-----------------------------------|
| request for garage door access code | generate random code | text message of unique code             | garage door company to send open signal | 2                              | 1                                 |
|                                     | send code            | text confirmation message to home owner | text message app                        |                                |                                   |
|                                     | code expires         |                                         |                                         |                                |                                   |

**34.** What input is needed for the application?

- (A) An address
- (B) Product description and dimensions
- (C) Time of day
- (D) A code requested by the delivery person

**35.** What is a security concern related to the data?

- (A) Neighbors or people walking or driving past the house could see the delivery.
- (B) Your data is accessible by companies in the cloud.
- (C) The code is not encrypted.
- (D) If there is a power outage, the garage door will stay up.

**36.** What output is provided?

- (A) Signal to open door
- (B) Alert text message to delivery company
- (C) Unique code to delivery person
- (D) All of the above

**37.** What is a most likely benefit?

- (A) Packages are not left out so they are not vulnerable to “porch pirates.”
- (B) Weather will not ruin packages.
- (C) More online sales result for everyone because safe delivery is ensured.
- (D) A regular delivery person for a route ensures the process is done correctly.

**38.** What is an impact to society?

- (A) More delivery drivers will be employed because these deliveries take longer.
- (B) The economy will get a boost with more purchases due to safer deliveries.
- (C) Most businesses will use or offer this service.
- (D) Less theft will occur as businesses will have proof that a delivery was made, lowering overall costs for everyone.

- 39.** If a programmer tested the following code with the values indicated, would the program correctly calculate the average of the test scores?

Assume all variables and lists have been appropriately initialized.

```
FOR EACH score IN testScores
{
    IF score > 0
    {
        total ← total + score
    }
    count ← count + 1
}
DISPLAY ("The average score on
the test was: ", total / count)
Test1 [100, 90, 80, 80, 85, 50, 0,
85, 90]
Test2 [192, 85, 74, 100, 96, 88]
```

- (A) Yes, the code works as it should for both test cases.
- (B) No, the code does not average the test scores correctly for either test.
- (C) No, the code only works for the Test1 scores.
- (D) No, the code only works for the Test2 scores.

- 40.** When should a heuristic algorithm be used?

- (A) When a problem is unable to process in reasonable time but a “close enough” solution is acceptable
- (B) When the data is not sorted and cannot be placed in the order needed
- (C) When a problem is undecidable because not enough information is known
- (D) When searching is needed but efficiency is a requirement

- 41.** How many times do FOR EACH loops run with lists?

- (A) Once
- (B) Until the index for the list is 0
- (C) For the LENGTH of the list
- (D) Until the user types STOP

- 42.** Which code below can replace the missing code to select data that is less than the targetValue and even? Assume all variables have been properly initialized.

```
IF < missing code >
{
    DISPLAY ("Found it!")
}
```

- (A) (num MOD 2 = 0) OR (targetValue < num)
- (B) (targetValue > num) AND (targetValue MOD 2 = 0)
- (C) (num MOD 2 = 0) AND (targetValue > num)
- (D) (targetValue > num) OR (NOT(num MOD 2 > 0))

- 43.** Which type(s) of statement is needed to find all records in a list that are positive?

- (A) Sequential and iterative
- (B) Selection and sequential
- (C) Selection
- (D) Iterative and selection

- 44.** Grace and Ada write algorithms and test them with increasingly large datasets. Algorithm 1 is still running while algorithm 2 completed before midnight. What can you determine about the algorithms?

- (A) One has an exponential efficiency and two has a polynomial efficiency.
- (B) One has a polynomial efficiency and two has an exponential efficiency.
- (C) One is unsolvable and two is decidable.
- (D) One is decidable and two is unsolvable.

- 45.** Each of the following can make an algorithm more readable except:

- (A) Well-named variables and procedures
- (B) Consistent formatting within the code
- (C) Procedures that have one purpose
- (D) Minimizing the use of loops so the program flow will be clearer

- 46.** For a block of code under an ELSE statement to run, the selection criteria result must be which of the following?

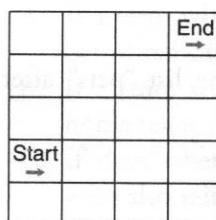
- (A) Repetitive
- (B) Compound
- (C) True
- (D) False

- 47.** Which set of pseudocode will correctly cause an alarm clock to chime at the correct time?
- Compare alarm time to current time  
If the times are not equal, check a.m./p.m. indicator  
If a.m./p.m. is equal, turn on alarm
  - Compare alarm time to current time  
If the times are equal, check a.m./p.m. indicator  
If a.m./p.m. is equal, turn on alarm
  - Compare alarm a.m./p.m. indicator to time a.m./p.m.  
If not equal, compare alarm time to current time  
If the times are equal, turn on alarm
  - Compare alarm a.m./p.m. indicator to time a.m./p.m.  
If not equal, compare alarm time to current time  
If the times are not equal, turn on alarm

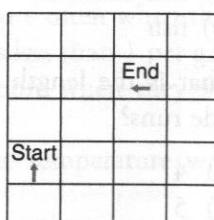
- 48.** Which diagram matches the code below?

```
MOVE_FORWARD(2)
ROTATE_LEFT(3)
MOVE_FORWARD(3)
ROTATE_RIGHT(1)
MOVE_FORWARD(1)
ROTATE_LEFT(3)
MOVE_FORWARD(1)
ROTATE_RIGHT(3)
```

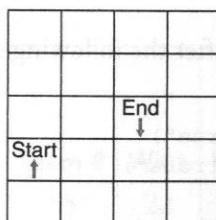
A.



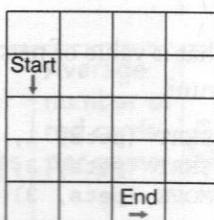
B.



C.



D.



- 49.** You need to swap the first and last values in a list. Which option produces the correct process?

- `list[1] ← list[LENGTH]`  
`list[LENGTH] ← list[1]`
- `tempValue ← list[LENGTH]`  
`list[1] ← tempValue`  
`list[LENGTH] ← list[1]`
- `tempValue ← list[LENGTH]`  
`list[LENGTH] ← list[1]`  
`list[1] ← tempValue`
- `tempValue ← list[LENGTH]`  
`list[1] ← tempValue`  
`list[LENGTH] ← list[tempValue]`

- 50.** What is the value of carChk after the code below runs?

```
PROCEDURE carMaint (miles)
{
    checkUp ← false
    IF (miles ≥ 4999)
    {
        checkUp ← true
    }
    RETURN (checkUp)
}
```

```
carChk ← carMaint(4999)
```

- False
- True
- 5000
- 4999

- 51.** Which of the following places the numbers in ascending order?

- 01011110
- 01011101
- 92

- i., ii., iii
- i., iii., ii
- ii., iii., i
- iii., ii., i

52. Will the code run as expected to dispense items purchased in a vending machine?

```

DISPLAY("Please insert money and make
a selection")

REPEAT UNTIL (amtPaid ≥ cost)
{
    amtPaid ← INPUT()
    DISPLAY("Please enter $ ", cost -
        amtPaid, "to make your purchase")
    amtPaid ← amtPaid + INPUT()
}

IF (amtPaid > cost)
{
    DISPLAY ("Your change
is $ ", (cost - amtPaid))
    Dispense(item)
    Dispense(change)
}
ELSE
{
    Dispense(item)
}
DISPLAY("Enjoy your selection!")

```

- (A) Yes, the code works as expected.
- (B) The REPEAT UNTIL loop is an infinite loop.
- (C) The calculation of the amount of change to return is incorrect.
- (D) The > sign should be < in the IF statement.

53. What is displayed after the following code runs?

```

rate←10
hours←40
totalPay←0
overtimePay←0

IF hours > 40
    DISPLAY("You earned overtime pay.")

ELSE
    DISPLAY("Regular Pay = $", hours * rate)

```

- (A) You earned overtime pay.
- (B) Regular Pay = \$40 \* 10
- (C) 400
- (D) Regular Pay = \$400

54. How many times does the following loop run?

```

numSold ← true
price ← x
REPEAT numSold TIMES
{
    sales ← numSold * price
    numSold ← numSold - 1
}

```

- (A) The REPEAT loop will run 5 times.
- (B) The REPEAT loop executes once and exits the loop after numSold's value changes.
- (C) The REPEAT loop never ends, creating an infinite loop because numSold's value keeps changing.
- (D) The program has an error and will not run.

**Questions 55–57 refer to the following code.**

```

count ← 1
pets ← ["dog", "dogfood", "cat",
"catfood", "fish"]
FOR EACH animal IN pets
{
    IF (animal = "fish")
    {
        DISPLAY (animal)
        INSERT(pets, count, "fishfood")
    }
    count ← count + 1
}

```

55. What will the code display?

- (A) dog, dogfood, cat, catfood, fish
- (B) dog, dogfood, cat, catfood, fish, fishfood
- (C) fish, fishfood
- (D) fish

56. What is the length of the list “pets” after the code runs?

- (A) 4
- (B) 5
- (C) 6
- (D) 7

57. What is value of pets[3] after the following code is run?

```

INSERT (pets, 1, "horse")
INSERT (pets, 2, "carrots")
REMOVE (pets, 3)

```

- (A) It is an empty field.
- (B) dog
- (C) dogfood
- (D) cat

58. What is this code doing? The list named *numbers* contains integers. Assume all variables are correctly initialized.

```
value1 ← 0
value2 ← 0
FOR EACH num in numbers
{
    value1← value1 + num
    value2 ← value2 + 1
}
value3 ← value1 / value2
```

- (A) Calculating how many numbers are in the list
- (B) Calculating the sum of all the values in the list
- (C) Calculating the average of the values in the list
- (D) Calculating the minimum value in the list

59. What should project teams do to produce a better software product?

- (A) Break down the problem into manageable units.
- (B) Code while requirements are being finalized to have more time for testing.
- (C) Spend testing time only on the complicated sections.
- (D) Not allow any changes from the user.

60. A soccer league tracks certain stats by team as seen in the table below. Which of the following CANNOT be determined by the data?

- (A) If a team wins more often when the number of red cards is less than 1 per game
- (B) If a team wins more when they were the home team
- (C) If days where the temperature was 80°F were also rainy
- (D) Team winning percentage

61. What is this block of code doing?

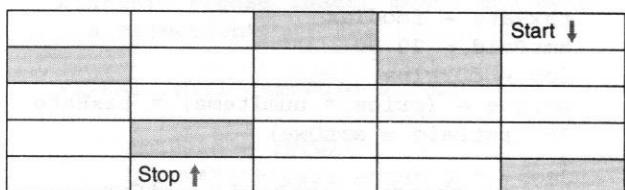
```
price ← p
numItems ← num
taxRate ← foodTax
amtPaid ← 20.00
inv ← currInv
amtOwe ← (price * numItems) * taxRate
IF (amtPaid ≥ amtOwe)
{
    change ← amtPaid - amtOwe
    inv ← inv - 1
}
ELSE
{
    DISPLAY("Please pay an
            additional $", amtOwe-amtPaid)
}
```

- i. Calculates the tax rate for an item.
- ii. Calculates current inventory numbers.
- iii. Calculates the change owed the customer or if the customer needs to pay more for their purchase.

- (A) i and ii
- (B) i and iii
- (C) ii and iii
- (D) i, ii, and iii

| Team # | Wins | Losses | Average number of red cards per game | Game day temperature higher than 80°F | Rain day before a game | Home games won |
|--------|------|--------|--------------------------------------|---------------------------------------|------------------------|----------------|
| 55     | 22   | 12     | 0                                    | 17                                    | 10                     | 19             |
| 42     | 11   | 23     | 1.5                                  | 13                                    | 15                     | 4              |
| 37     | 19   | 15     | 0.5                                  | 14                                    | 17                     | 12             |

- 62.** Which set of code will move the robot from start to stop? The robot may not use gray blocks.



(A)  
MOVE\_FORWARD(2)  
ROTATE\_RIGHT(1)  
MOVE\_FORWARD(4)  
ROTATE\_LEFT(1)  
MOVE\_FORWARD(2)  
ROTATE\_RIGHT(1)  
MOVE\_FORWARD(1)  
ROTATE\_LEFT(1)

(B)  
MOVE\_FORWARD(3)  
ROTATE\_LEFT(3)  
MOVE\_FORWARD(2)  
ROTATE\_LEFT(1)  
MOVE\_FORWARD(1)  
ROTATE\_LEFT(3)  
MOVE\_FORWARD(1)  
ROTATE\_LEFT(3)

(C)  
MOVE\_FORWARD(3)  
ROTATE\_RIGHT(3)  
MOVE\_FORWARD(2)  
ROTATE\_RIGHT(1)  
MOVE\_FORWARD(1)  
ROTATE\_RIGHT(3)  
MOVE\_FORWARD(1)  
ROTATE\_RIGHT(3)

(D)  
MOVE\_FORWARD(1)  
MOVE\_FORWARD(1)  
ROTATE\_RIGHT(1)  
MOVE\_FORWARD(1)  
MOVE\_FORWARD(1)  
MOVE\_FORWARD(1)  
ROTATE\_LEFT(1)  
MOVE\_FORWARD(1)  
MOVE\_FORWARD(1)

- 63.** Which of the algorithms below will produce the same result? Select two answers.

- (A) Processing a list from the beginning to the end and counting the number of elements that begin with the letter “a”
- (B) Processing a list from the end to the beginning and counting the number of elements that begin with the letter “a”
- (C) Processing the list with a merge search to group the elements that begin with “a” and then counting them
- (D) Processing the list with a procedure to see if the element begins with the letter “a” and keeping count with a local variable

- 64.** An alarm company records the number of times each door is opened and closed. The alarm cannot be set if a door is still open. How can the alarm company code this option in its software? Select two answers.

- (A) If the door count multiplied by 2 gives an odd number, then the door is open.
- (B) If door count MOD 2 = 1, then the door is open.
- (C) If the number of times a door is opened does not equal the number of times it is closed, then the door is open.
- (D) If the quotient of dividing the door count by two is an even number, then the door is open.

- 65.** A simulation for a new app to allow students to place a lunch order by 11:00 a.m. to speed up the lunch line is being tested. What information will the simulation provide? Select two answers.

- (A) If a new line at the pick-up station will cause a slowdown
- (B) If students will use the app often enough to make it worth the cost of developing
- (C) If the app will decrease the amount of wasted food
- (D) If the app can speed up the lunch line

66. If two people need to collaborate on a document but are in two different locations, what is the best solution? Select two answers.
- (A) One person should travel to the other person's location for better communication.  
(B) Assign a different person to work on the document that is located in the same place as one of the others.  
(C) Use a cloud-based service for the document so both can edit the current version of the document.  
(D) Hold video conferences for them to speak face-to-face to discuss the document.
67. Why are "citizen scientists" being used on projects? Select two answers.
- (A) They can record local data to be included in global databases.  
(B) They are paid minimum wage.  
(C) They can record data over a longer period of time.  
(D) Retired scientists can maintain involvement in their area of expertise.
68. Which items can be represented by two *binary* digits? Select two answers.
- (A) Pizza with 10 slices  
(B) Number of eyes humans have  
(C) Number of letters in the word "dog"  
(D) Number of donuts in a dozen
69. Which expressions are equivalent to  $\text{number} \leq 42 \text{ AND } (\text{grade} \geq 9)$ ? Select two answers.
- (A)  $\text{NOT } (\text{number} > 42) \text{ AND } (\text{grade} = 9 \text{ OR } \text{grade} > 9)$   
(B)  $(\text{number} < 43) \text{ AND } (\text{grade} > 8)$   
(C)  $(\text{number} < 42) \text{ AND } (\text{NOT } (\text{grade} < 9))$   
(D)  $(\text{number} > 43) \text{ AND } (\text{grade} > 10)$
70. What data structures provide the ability to code once and repeat multiple times in a program? Select two answers.
- (A) Selection statements  
(B) Sequential statements  
(C) Iterative statements  
(D) Procedures

**STOP. End of Exam**