AP Computer Science Principles: Practice Exam 2

Multiple-Choice Questions

Time: 2 hours
Number of questions: 74
The multiple-choice questions represent 60% of your total score.

Directions: Choose the one best answer for each question. Some questions at the end of the test have more than one correct answer; 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 seven-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.

If you tore out the pages earlier and have lost them, the reference sheet is also available near the end of the PDF publication, "Assessment Overview and Performance Task Directions for Students" 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 data set, you receive an error on your computer screen, in hexadecimal format: F1.
   Convert the error message from hexadecimal 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 data set 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) Amount is represented in hexadecimal and in the conversion to decimal, he replaced an F with an E and deposited the difference.

3. You want to buy a ticket for a concert, but need to save enough money first. You know there are 5,000 seats in the venue, but they accidentally display the number of seats left in hexadecimal. If the number showing is $E8_{16}$, what is the decimal equivalent?

   (A) 232
   (B) 148
   (C) 3864
   (D) 562

4. You want to match the color for your favorite college team. The color you want to use is listed in decimal as (75, 156, 211). Which color is it, given options with hexadecimal equivalents for (Red, Green, Blue)?

   (A) #B49C133
   (B) #411C9134
   (C) #4B9CD3
   (D) #B4C93D

5. A group of students is collaborating to design an app to let students reserve a study room in the library. They are trying to decide how to check a room's availability. Which suggestion below is best and why?

   (A) Using real-time processing to ensure the app has current information
   (B) Creating a loop to prevent the student from over-writing another room reservation
   (C) Creating a procedure named "checkroom" because it can be called for each room and time slot
   (D) Directing students to the phone number to call the library to confirm their reservation

6. What order should the following procedures be used in creating the app from Question 5?

   - 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()

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Questions 7 and 8 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
```

7. 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 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.

8. 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?

   (A) Change the program to allow songs to be played 1,000 times before being deleted.
   (B) Send the user a message to confirm they want to delete the song stating it can never be added back to the list.
   (C) Write a new procedure to add a song back to the list if it had been on the list previously.
   (D) Set song_Times_Played back to 0 after removing a song.

9. An airplane simulation to train new pilots on typical take-offs and landings is designed specifically for cargo planes. Which variable does NOT need to be included?

   (A) Weight of aircraft
   (B) Number of crew for the airplane
   (C) Where the cargo is located in the cargo hold
   (D) Number of monthly bird strikes for this type of aircraft

10. If a program is expecting a data field to contain a string, using the section of the ASCII table below, how will the code interpret the binary number 01101010 for that data field?

Decimal	Hexadecimal	Binary	Octal	Char
97	61	01100001	141	a
98	62	01100010	142	b
99	63	01100011	143	c
100	64	01100100	144	d
101	65	01100101	145	e
102	66	01100110	146	f
103	67	01100111	147	g
104	68	01101000	150	h
105	69	01101001	151	i
106	6A	01101010	152	j
107	6B	01101011	153	k
108	6C	01101100	154	l
109	6D	01101101	155	m
110	6E	01101110	156	n
111	6F	01101111	157	o
112	70	01110000	160	p
113	71	01110001	161	q
114	72	01110010	162	r
115	73	01110011	163	s
116	74	01110100	164	t
117	75	01110101	165	u
118	76	01110110	166	v
119	77	01110111	167	w
120	78	01111000	170	x
121	79	01111001	171	y
122	7A	01111010	172	z

   (A) 106
   (B) 6A
   (C) 152
   (D) j

11. Which of the following will evaluate to false?

```
 i. false AND (true OR NOT(false))
ii. true AND (NOT(true AND false))
iii. NOT (false OR (true OR false))
```

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

12. Which of the following will evaluate to true?

```
 i. (true OR false) AND
    NOT(true OR NOT(false))
ii. NOT (true AND
    (NOT(true OR false)))
iii. (NOT(true) OR (true AND false))
```

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

13. A group that is watching sea turtle nests records data about their nests. Which of the following is metadata?

(A) Daily temperature of the nest
(B) Date the eggs were laid
(C) Nest tag
(D) Number of data fields tracked

14. 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?

(A) Lossless compression will allow the scientists to see the video in full resolution.
(B) Lossy compression will make the file small enough to send.
(C) They should be combined for the best compression.
(D) Any compression technique will be sufficient.

15. When listening to an online music service, you see some ads local to your location. How does the music site determine what ads to show you?

(A) It shows ads based on the bands you listen to and where the band members grew up.
(B) It shows ads based on the location of the bands' current tour.
(C) It uses the location feature on the device playing the music.
(D) It plays a random selection of ads and you just notice the local ones more.

16. Which of the following techniques would be best to use to further analyze patterns that emerged during data mining?

i. Classifying data to categorize it into distinct groups.
ii. Cleaning data to determine which data to include in the processing.
iii. Clustering data to separate data with similarities into subclasses.
iv. Filtering to set conditions so only records meeting the criteria are included.

(A) i, ii, iii
(B) i, iii, iv
(C) i, ii, iv
(D) i, ii, iii, iv

17. A new discovery has been made from analyzing data. Which of the following methods will most effectively share the discovery?

(A) Create a video explaining the highlights and wait for it to go viral.
(B) Use diagrams and images and publish the discovery on a professional website for peer review.
(C) Post it on the Web but with a password to ensure only those in the field of study can view it.
(D) Publish the findings in a local newspaper.

18. New data is available to add to a company's existing data. The IT director wants to store the new data on the cloud. What is a concern that needs to be addressed before implementing the plan?

(A) The security of the data being transmitted back and forth
(B) The latency delay in requesting and receiving access to the data
(C) The redundancy of the Internet increasing the cost
(D) The cost the ISP will charge to access the cloud

19. 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 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 Caesar cipher to protect their data.
(C) They should only send non-sensitive data off-site.
(D) They should make physical copies of their data and ship it to the off-site location weekly.

20. In putting together a team, the project manager wants to have members with different backgrounds, even if they are in non-related 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.

21. What should an organization with fluctuating data storage needs consider?

(A) Using server farms for scalable solutions as data needs change
(B) Keeping all processing on-site
(C) Downsizing to maintain a more consistent data flow
(D) Duplicating business processing to ensure correctness

22. Which of the following will help organizations gain insights about their business?

(A) Collecting and analyzing big data to identify patterns and trends they can use to their advantage
(B) Separating big data into smaller data sets 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

23. How does the end-to-end architecture of the Internet work?

(A) It's designed like a circle; so ironically, there are no "ends".
(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.

24. How do Internet packets travel to their destination?

(A) Router to router based on the Travelling Salesman algorithm
(B) Along the same path to stay in order
(C) Timed to arrive at the destination in their correct order
(D) Along a variety of different paths

25. What is an Internet Protocol (IP) and why are protocols used?

(A) Protocols are a set of rules used to ensure packets can be transmitted across different equipment used with the Internet.
(B) Protocols are procedures used to police the Internet.
(C) Protocols classify the data into clusters used for Internet traffic analysis.
(D) Protocols measure the latency on the Internet to determine the fastest path to send the data.

26. Which web address is the third-level domain?

http://anytime.anyway.anyplace.edu/apcsp

(A) anyway.anyplace.edu
(B) anytime.anyway.anyplace.edu
(C) anyplace.edu/apcsp
(D) edu

27. What is bandwidth?

(A) The amount of data that can be transmitted in a specified amount of time
(B) The speed that data can be downloaded
(C) The size of the cable that connects homes and businesses to the Internet
(D) The type of wireless access point in use at a location

28. How can consumers ensure that a website is not a phishing scam before making an Internet purchase?

(A) Go to the website directly rather than clicking a link from an email.
(B) Call the company directly to be safe.
(C) Use antivirus software and keep it up to date.
(D) Use a firewall to block malware.

29. What is a cybersecurity attack that floods a website with too many requests causing it to slow down or crash?

(A) A Man-in-the-Middle (MITM) attack because the website is surrounded by devices attacking it
(B) A firewall breach because the attackers only need one "brick in the wall" to crack to gain entry
(C) A Distributed Denial-of-Service (DDoS) attack because the website requests come from multiple locations
(D) A net-phishing attack, which casts a wide "net of requests" over the website

30. What are brute-force attacks?

(A) Attacks that use frequency analysis to break passwords
(B) Attacks that check each possible solution to break encrypted data
(C) Attacks against DNS servers to enable DDoS attacks
(D) Attacks on firewalls to gain access to a company's sensitive data

31. Where should a company that is expanding to a new region place their data and why?

(A) It should duplicate the data at both locations to provide backup and redundancy.
(B) It should keep the data at headquarters and use dedicated lines to keep the data secure.
(C) Half the data should be at each location to reduce the demand on the servers and reduce latency.
(D) It should place their data in the cloud so everyone can reach it at any time.

32. Why is the Internet designed to be fault tolerant?

(A) People often have typos in their web requests and fault tolerance prevents the system from crashing when these occur.
(B) So the Internet can keep running even when it has malware.
(C) So it can keep running when sections of it are not working.
(D) So as companies move from IPv4 to IPv6, conflicts can be resolved.

33. Advances in sensor technology have had many benefits. Which of the following is **NOT** an advance in assistive technology to help people live more independently?

(A) Sensors can be connected to contact family members or emergency services.
(B) Sensors can help people call for help if they fall.
(C) Sensors can turn off appliances.
(D) Sensors can guide wheelchairs to automatically load and unload people into their vehicles.

34. While crowdsourcing is often used to fund projects, what is another use in practice today?

(A) Diagnosing medical conditions by asking if others have similar symptoms
(B) Asking those who register with a company to evaluate new products
(C) Lowering costs by using the crowd's computers
(D) Matching people needing work with job openings

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35. If data mining identifies new patterns, what should a company do with the information?

(A) Further analyze the data pattern identified to make strategic decisions.
(B) Change the prices on their products to match the findings for increased sales.
(C) Get their products to market faster to increase their profit.
(D) Use it to place targeted ads with people who are repeat customers.

36. What is the purpose of the DMCA?

(A) To provide protection for intellectual property in digital format that has copyright status
(B) To enable music and movie downloads and streaming for wider sharing of people's creative works
(C) To give acknowledgment to the creator of a digital work when it is used by others
(D) To provide the software to share digital files legally

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

Assume all variables and lists are appropriately initialized.

```
Block 1

REPEAT UNTIL x ≤ 0
{
    APPEND (roster, name)
    x ← x + 1
}

Block 2

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

(A) Block 1
(B) Block 2
(C) Both Block 1 and Block 2
(D) Neither Block 1 nor Block 2

38. 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")
}
```

39. Why is a binary search the most effective way to search a sorted data set?

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

40. Which of these is NOT a Boolean expression?

(A) `IF (eyes = brown AND height > 60)`
(B) `REPEAT UNTIL (song = favSong)`
(C) `IF (NOT(pet = cat))`
(D) `x ← (x + 42)`

41. 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.

42. A high school has two rows of lockers. Even numbered lockers are on the top row and odd numbered lockers are on the bottom. Do the following two algorithms correctly calculate which lockers should be counted as even numbered ones for the top row and which should be counted as odd numbered lockers for the bottom row?

Block 1

```
IF (count MOD 2 = 1)
{
   topLocker ← topLocker + 1
}
```

Block 2

```
IF (NOT (count MOD 2 = 1))
{
   bottomLocker ← bottomLocker + 1
}
```

(A) Block 1 works correctly.
(B) Block 2 works correctly.
(C) Both blocks work correctly.
(D) Neither block works correctly.

43. If a large file has multiple duplicates in it that should be removed prior to using it for analysis, in what order should the following procedures be called?

```
  i. ProcessFile( )
 ii. RemoveDuplicates( )
iii. SortFile( )
```

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

44. When should a heuristic algorithm be used?

(A) When a problem is intractable 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

45. 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

46. 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))

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47. 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

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

(A) One is intractable and two is tractable.
(B) One is tractable and two is intractable.
(C) One is unsolvable and two is decidable.
(D) One is decidable and two is unsolvable.

49. 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

50. 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

51. Which set of pseudocode will correctly cause an alarm clock to chime at the correct time?

(A) Compare alarm time to current time
If the times are not equal, check am/pm indicator
If am/pm is equal, turn on alarm

(B) Compare alarm time to current time
If the times are equal, check am/pm indicator
If am/pm is equal, turn on alarm

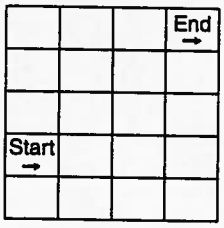
(C) Compare alarm am/pm indicator to time am/pm
If not equal, compare alarm time to current time
If the times are equal, turn on alarm

(D) Compare alarm am/pm indicator to time am/pm
If not equal, compare alarm time to current time
If the times are not equal, turn on alarm

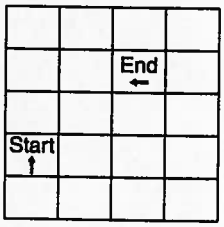
52. Which diagram matches the code below?

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

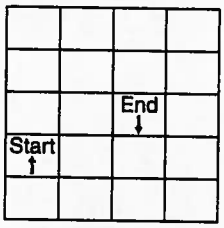
A.



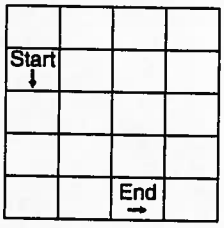
B.



C.



D.



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

(A)
```
list[1] ← list[LENGTH]
list[LENGTH] ← list[1]
```

(B)
```
tempValue ← list[LENGTH]
list[1] ← tempValue
list[LENGTH] ← list[1]
```

(C)
```
tempValue ← list[LENGTH]
list[LENGTH] ← list[1]
list[1] ← tempValue
```

(D)
```
tempValue ← list[LENGTH]
list[1] ← tempValue
list[LENGTH] ← list[tempValue]
```

54. 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)
```

(A) False
(B) True
(C) check up
(D) 4999

55. Which of the following places the numbers in ascending order?

i. 01011110
ii. 5F
iii. 72

(A) i, ii, iii.
(B) i, iii, ii.
(C) ii, iii, i.
(D) iii, i, ii.

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

```
DISPLAY("Please insert money and make
  a selection")
amtPaid ← INPUT( )

REPEAT UNTIL (amtPaid ≥ cost)
{
     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.

57. 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

58. 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.

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Questions 59–61 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
}
```

59. What will the code display?

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

60. What is the length of the list "pets" after the code runs?

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

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

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

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

62. While cookies have advantages such as convenience and personalization, what is a concern with the use of cookies?

(A) Targeted advertising
(B) Cookies taking up storage on your device
(C) Privacy of personal data
(D) Increased latency on the browser requests

63. 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.
(C) Reduce the testing step to the more complicated conditions only.
(D) Not allow any changes from the user.

64. 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

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

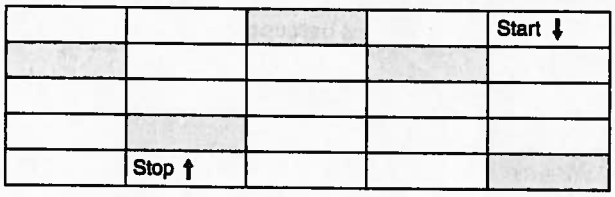
65. What is this block of code doing?

```
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 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

66. 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)
```

67. 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

68. 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 their software? Select two answers.

(A) If the door count multiplied by 2 gives an odd number, then the door is open.
(B) If door 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.

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69. 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 slowdow
(B) If students will use the app often enough to make it worth the cost of developing
(C) If the app will decrease the cost of wasted food
(D) If the app can speed up the lunch line

70. 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 needs to travel to the other person's location.
(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 it.
(D) Hold video conferences for them to speak face to face to discuss the document.

71. 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) To keep retired scientists involved in their area of expertise.

72. Which of the following are data aggregation techniques used to protect privacy? Select two answers.

(A) Removing names from the data records
(B) Changing all patient names to the same name
(C) Adding a check digit to the zip code
(D) Grouping the data based on zip codes

73. How has communication changed with cloud computing? Select two answers.

(A) It has facilitated asynchronous communication with email and text messaging.
(B) It has facilitated synchronous methods with video conferencing.
(C) Small businesses fall further behind large companies as they cannot afford to take advantage of the cloud computing communication benefits.
(D) Confidential communications are being sent via the postal service to ensure they remain secure.

74. Which of the following are benefits resulting from technological innovations in education? Select two answers.

(A) Online courses are available if a school cannot teach a specific course.
(B) Online textbooks are available during the school day.
(C) Classes can participate in virtual field trips.
(D) The digital divide is minimizing the gap of educational opportunities available to all.

STOP. End of Exam