AP CSP Practice Exam 2019

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74 questions, 2 hours

1. Which term does the following statement describe?

Any sequence of characters we can type between a pair of single, double, or triple quotes

(A) Variable
(B) Function
(C) Code
(D) String

2. Which is NOT true of a Turing Machine?

(A) A device that can be programmed to compute anything that can be mathematically computed.
(B) Any machine that passes the Turing Test
(C) A machine that can read instructions from a tape and write results to the tape
(D) A computer that cannot repeat steps

Use the following code for questions 3 and 4.

```
animal_1 ← "Garfield"
animal_2 ← "Fido"
animal_3 ← "Gary"
animal_1 ← animal_2
animal_3 ← animal_1
animal_2 ← "fish"

DISPLAY(animal_3)
```

3. What will print out when the code is run?

(A) "Fido"
(B) animal_1
(C) animal_3
(D) “Garfield”

4. Which of the following is *animal_1* is an example of?

(A) A name
(B) A string
(C) A function
(D) A variable

5. Which of the following are mutable?
   (A) Strings
   (B) Lists
   (C) Integer
   (D) Boolean

6. What describes the process of searching data sets for incomplete data records to process?
   (A) Classifying
   (B) Cleaning
   (C) Clustering
   (D) Filtering

7. Which of the following is *not* a legal variable name?
   (A) _a1SteakSauce
   (B) My_name
   (C) 1more-try
   (D) LOL
   (E) alotOfexamStuff

8.
```
result ← 1 / 4
DISPLAY (result)
```

   What will the above code print?
   (A) .25
   (B) 0
   (C) ¼
   (D) .2

9.
```
Mid ← 8
Right ← 10
Left ← 4
Product ← Right *((Right+Left)+ Mid)
```

   What is the value of `Product`?
   (A) 122
   (B) 220
   (C) 420
   (D) 0

10. How do the World Wide Web and the Internet work together?
    (A) They are the same.
    (B) The Internet cannot search using user-specified queries, the Web can.
    (C) The Internet uses the Web to connect devices to share data.
    (D) The Web uses HTTP to share computational artifacts using the Internet.

11. Which of the following is a main advantage for a company placing their data in the cloud?
    (A) Everyone with access can reach it at any time.
    (B) The cloud keeps their information private from other companies.
    (C) The cloud blocks all information from its employees.
    (D) Half of the company's data can be transferred to other locations to reduce demand on servers.

12.
```
num ← 4 MOD 2
DISPLAY(num)
```

    What will the following code print out?
    (A) 2
    (B) 4
    (C) 0
    (D) None

Use the following code for questions 13 and 14.

```
distance ← 100.0
mpg ← 20.0
gallons ← distance / mpg
costPerGallon ← 3.00
costTrip ← gallons * costPerGallon
```

13. What is the value of `gallons`?
    (A) 0.5
    (B) 5.0
    (C) 15.0
    (D) 20

14. What is the value of `costTrip`?
    (A) 15.0
    (B) 15
    (C) 5.0
    (D) 3.00

15. What shape will the function `square(turtle)` return?

```
def square(turtle):
      turtle.forward(100)
      turtle.right(90)
      turtle.forward(100)
      turtle.right(90)
      turtle.forward(100)
      turtle.right(90)
      turtle.forward(100)
      turtle.right(90)
return "What a fast turtle!"
```

(A) "What a fast turtle!"
(B) A square
(C) A turtle
(D) A triangle

16. What will the following code print?

```
PROCEDURE counter(lst):
      count ← 0
      FOR EACH item IN lst:
            {
                  count ← count + item
            }
      RETURN (count)

new_list ← [1,2,3,4]
run_counter ← counter(new_list)
DISPLAY (run_counter)
```

(A) 10
(B) [1,2,3,4]
(C) 4
(D) None

17. Why do we stop at 101 in the program below?

```
sum ← 0
numbers ← RANGE(0,101,2)
FOR EACH number IN numbers:
      {
      sum ← sum + number
      }
DISPLAY(sum)
```

(A) Because we started at 0
(B) Because we want to include 100
(C) Because the computer only understands 1s and 0s
(D) Because we're using a step of 2

18. Which of the following will result in an infinite loop?

(A)
```
x ← "heLLo"
while x[2] == 'L':
    DISPLAY(x)
    x ← x.split('h')
```

(B)
```
my_num ← 6
while my_num ≠ 0:
     DISPLAY("Hello World")
     my_num ← my_num % 2
```

(C)
```
counter ← 10
while counter > 0:
    DISPLAY(counter)
    counter ← counter + 1
```

(D)
```
x ← 5
while x > 0:
     DISPLAY(x)
     x ← x - 1
     DISPLAY("x is now" + x)
```

19. What number should be added in the blank to make the following function print the number 6?

```
x ← 3
i ← 0
while i < 3:
    x ← i*___
    i ← i + 1
DISPLAY(x)
```

(A) 4
(B) 2
(C) i
(D) 3

20. What will the following code print?

```
newS ← "?"
phrase ← "Where are you going with that?"
for EACH item in phrase:
     { newS ← newS + item }
DISPLAY(newS)
```

(A) “Where are you going with that?”
(B) Nothing
(C) “?”
(D) “?Where are you going with that?”

21. Refer to the code below. Suppose someone wants to test this. When they reach line 3, they enter “5.” What will happen?

```
Line 1: x ← 1
Line 2: DISPLAY(x)
Line 3: x ← INPUT()
Line 4: DISPLAY(x)
```

(A) The following output occurs: 1x
(B) An error occurs. A person could use the INPUT() function like this, but nothing is entered into the `INPUT()` function, so nothing would print out.
(C) The following output occurs: 1 5
(D) An error occurs. You cannot display the value of variables in programming.

22. Tucker is writing his first program. He wants the program to say “hey” to him. Below is an overview of what he hopes the program will do:

1. Display “Please enter your name.”
2. The user enters in their name: TUCKER
3. The computer displays: “Hey TUCKER”.

Which of the following programs will do what Tucker wants?

(A)
```
x ← INPUT()
DISPLAY(x)
DISPLAY(“Hey”)
DISPLAY(“Please enter your name.”)
```

(B)
```
DISPLAY(“Please enter your name.”)
x ← INPUT()
DISPLAY(“Hey”)
DISPLAY(x)
```

(C)
```
DISPLAY(“Hey”)
x ← INPUT()
DISPLAY(“Please enter your name.”)
DISPLAY(x)
```

(D)
```
DISPLAY(“Please enter your name.”)
x ← INPUT()
DISPLAY(x)
DISPLAY(“Tucker”)
```

23. Given two variables, `num1` and `num2`, which of the following would mean that both `num1` and `num2` are positive integers?

(A) `(num1 = num2)`
(B) `(num1 = num2) OR (num1 ≠ num2)`
(C) `(num1 = num2) AND (num1<0)`
(D) `(num1 = num2) AND (num2>0)`

24. Consider the code below.

```
IF(freshman)
 { DISPLAY("I am a freshman.") }
```

If the variable freshman is true, what is displayed?

(A) DISPLAY("I am a freshman.")
(B) "I am a freshman."
(C) DISPLAY(freshman)
(D) Nothing will print out.

25. Consider the code below.

```
IF(freshman)
   { DISPLAY("I am a freshman.") }
ELSE
   { DISPLAY("I am not a freshman.")}
```

If the variable `freshman` is false, what is displayed?

(A) "I am a freshman."
(B) Nothing is displayed
(C) "I am not a freshman."
(D) DISPLAY("I am not a freshman.")

[MOVE TO NEXT PAGE]

26. Consider the code below for problems 26-28.

```
IF(freshman)
   { DISPLAY("I am a freshman.") }
ELSE
      IF(sophomore)
         { DISPLAY("I am a sophomore") }
      ELSE
         { DISPLAY("Who knows what I am?") }
```

If the variable `sophomore` is false, what is displayed?

(A) "I am a sophomore."
(B) "I am a freshman."
(C) "Who knows what I am?"
(D) It is impossible to tell with the given information.

27. Use the code from the previous question. If variables `freshman` and `sophomore` are false, what is displayed?

(A) "I am a sophomore."
(B) "I am a freshman."
(C) "Who knows what I am?"
(D) It is impossible to tell with the given information.

28. Use the code from the previous question. If variable `freshman` is false and `sophomore` is true, what is displayed?

(A) "I am a sophomore."
(B) "I am a freshman."
(C) "Who knows what I am?"
(D) It is impossible to tell with the given information.

[MOVE TO NEXT PAGE]

29. Consider the following code.

```
x ← 2
figure ← 0
REPEAT UNTIL figure > 15
      {
        figure ← 3 * x
        x  ← x + 1
       }
DISPLAY("figure =")
DISPLAY(figure)
DISPLAY(", x =")
DISPLAY(x)
```

What is displayed as a result of running the code above?

(A) figure = 15, x = 6
(B) figure = 18, x = 3
(C) figure = 15, x = 7
(D) figure = 18, x = 7

30. Consider the following code.

```
x ← 1
figure ← 0
REPEAT UNTIL figure > 20
      {
         figure ← 5 * x
         x  ← x + 1
       }
DISPLAY("figure =")
DISPLAY(figure)
DISPLAY(", x =")
DISPLAY(x)
```

What is displayed as a result of running the code above?

(A) Figure = 30, x = 6
(B) Figure = 20, x = 5
(C) Figure = 25, x = 6
(D) Figure = 25, x = 5

31. A grocery store uses a database to store important statistics. The prices of all items are stored in a list called `itemList`, which is indexed from 1 to x. The company uses the following program to assign the *index of the item* in the store that has the highest price to the variable `max`.

```
i ← 0
max ← i + 1
x ← LENGTH(itemList)
REPEAT x times
{
      i ← i + 1
      <MISSING CODE>
}
```

Which of the following code segments can replace `<MISSING CODE>` so that the program works as intended?

```
(A)   IF(itemList[i] > max)
      {
         max ← itemList[i]
      }
(B)   IF(itemList[i] > itemList[max])
      {
         max ← i
      }
(C)   IF(itemList[i] < itemList[max])
      {
         max ← i
      }
(D)   IF(itemList[i] > itemList[max])
      {
         max ← itemList[i]
      }
```

32. What does iteration with computer science loops mean?
    (A) Executing code once
    (B) Repeating a block of code until a condition is met
    (C) Duplicating a section of code multiple times in a program
    (D) Debugging code multiple times until it passes testing

33.

```
weight ← 0.5
IF weight < 1
   { price ← 1.45 }
IF weight >= 1
   { price ← 1.15 }
total ← weight * price
DISPLAY(weight)
DISPLAY(price)
```

What will be printed?

(A) 0.5

1.45

(B) 0.5

0.75

(C) 0

(D) 1.45

34.

```
numItems ← 1
IF numItems ← 1
      { message ← "You ordered 1 item" }
IF numItems > 1
      { message ← "You ordered " + numItems + " items" }
DISPLAY(message)
```

What will print if `numItems ← -2`?

(A) "You ordered -2 items"

(B) "You ordered 1 item"

(C) Nothing will be printed.

(D) You will get an error message.

35.

```
numbers ← [-1,0,1]
FOR EACH item IN numbers:
    IF item > 0:
        DISPLAY("positive")
    ELIF item < 0:
        DISPLAY("negative")
    ELSE:
        DISPLAY("neither")
```

What will print when this code is run?

(A)
```
negative
neither
positive
```
(B)
```
positive
```
(C)
```
negative
positive
```
(D)
Nothing will print

36. What is the default direction a turtle object is facing?
(A) North
(B) South
(C) East
(D) West

37. What will print when the following code is run?

```
myLst ← [0,5,10,15,20,25]
FOR EACH item IN myLst[:3]:
     {     y ← x*2
     myLst.APPEND(y)    }
DISPLAY(myLst[4:])
```

(A) [0, 5, 10, 20, 25, 0, 10, 20, 30]
(B) [20, 25, 0, 10, 20]
(C) [25, 0, 10, 20]
(D) [0, 5, 10, 15]

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

39. 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 II
(D) II and III

40. A person is creating a program about cities. So far, he has created a list of cities called `cityList`. He wants to check for repeated cities and remove them. To do this, the code may use a procedure called `isFound(list, name)`. `isFound(list, name)` returns `true` if name is found in list and returns `false` if not found in list. He wants to write code to count how many time a city occurs. The procedure is called `frequencyCount(list, name)`. It will return the number of times `name` appears in a list.

Which of the following could be correct implementation of `frequencyCount`?

```
(A)   PROCEDURE frequencyCount(list, name)
       {
         count ← 0
         REPEAT LENGTH(list) TIMES {
            IF (NOT(isFound(list, name))){
               RETURN(0)
            }
            ELSE {
              RETURN(count)
             }
           }
         }
```

(B)
```
PROCEDURE frequencyCount(list, name) {
   count ← 0
   REPEAT LENGTH(list) TIMES {
      IF (isFound(list, name)) {
         count ← count + 1
      }
   }
   RETURN(count)
}
```

(C)
```
PROCEDURE frequencyCount(list, name) {
   i ← 1
   count ← 0
   REPEAT LENGTH(list) TIMES {
      IF (isFound(list, name)) {
         count ← count + 1
         REMOVE(list, i)
      }
      ELSE {
         i ← i + 1
      }
   }
   RETURN(count)
}
```

(D)
```
PROCEDURE isFound(list, name) {
   count ← 0
   REPEAT LENGTH(list) TIMES {
      IF (frequencyCount(list, name)) {
         count ← count + 1
      }
   }
   RETURN(count)
}
```

41. Which of the following would be considered a subdomain of umich.edu according to the guidelines of the Domain Name System (DNS)?

(A) umich.edu/help
(B) umich.edu.subdomain
(C) students.umich.edu
(D) umich.edu

42. Which of the following have increased the availability of communication and collaboration between people at a distance?

I. Social media
II. SMS
III. Email

(A) I, II
(B) I, III
(C) I, II, III
(D) None of the above

43. A weatherman record atmospheric data to predict future weather conditions. Suppose that his lab in Detroit takes hourly measurements of air temperature and precipitation in the city for a total period of 12 months. The lab also records the exact time and date for each measurement.

Which of the following questions about the Detroit's weather could NOT be accurately answered using only the data collected by the lab?

(A) How does temperature fluctuate in Detroit from day to night?
(B) What is the average annual precipitation?
(C) Is there a correlation between air temperature and precipitation?
(D) What is the average daily temperature?

44. Use the information from the previous question. Which of the following could be accurately answered using only the data collected by the lab?

(A) What is the average time the sun is out each day?
(B) Is there a correlation between precipitation in Detroit and Kalamazoo?
(C) Is there a correlation between daily air temperature and sunrise time?
(D) During which hour of the day does it rain most on average?

45. What does "IP" stand for in IP address?

(A) Internal procedure
(B) International protocol
(C) Internet procedure
(D) Internet protocol

46. The internet transmits data from computer to computer by breaking down data into what are known as:

(A) Data
(B) Packets
(C) Words
(D) Bits

47. What is Moore's law?
    (A) Processing power will double every 18 months
    (B) An object in motion tends to stay in motion
    (C) Artificial intelligence development will stop once it reaches the intelligence of humans
    (D) Computational power has a limit

48. A programmer is writing code to swap two user-input values. The program will ask the user for two inputs and stores them in `value1` and `value2`, then switch the two values. Which of the following correctly does this?

```
(A)   value1 ← INPUT()
      value2 ← INPUT()
      value2 ← value1
      value1 ← value2

(B)   value1 ← INPUT()
      value2 ← INPUT()
      temp ← value1
      value2 ← temp
      value1 ← temp

(C)   value1 ← INPUT()
      value2 ← INPUT()
      temp ← value1
      value1 ← value2
      value 2 ← temp

(D)   value1 ← INPUT()
      value2 ← INPUT()
```

49. Which of the following algorithms, given a list of integers, require both selection and iteration?
    (A) An algorithm that returns the number of elements that are positive.
    (B) An algorithm that returns true if the first element equals the last.
    (C) An algorithm that calculates the average of the elements in the list.
    (D) An algorithm that swaps the first and second elements in the list.

50. Linear search is also known as:
    (A) Binary search
    (B) Sequential search
    (C) Internet search
    (D) Program search

51. Which of the following is true about linear and binary search?
    (A) Linear search is more efficient for large data sets than binary search.
    (B) Binary search does not work on ordered sets.
    (C) Linear search looks at one element at a time.
    (D) Binary search is better for smaller sets.

52. Which of the following statements is NOT true?
    (A) An unsolvable problem cannot be solved using any algorithm.
    (B) A solvable problem can be solved using an algorithm.
    (C) Some solvable problems will not run in reasonable time.
    (D) An unsolvable problem can be solved using an algorithm.

53. Which of the following statements is NOT true?
    (A) An undecidable problem may have a solution for some situations but not all.
    (B) A decidable problem has a solution for all situations.
    (C) An undecidable problem may or may not run in reasonable time and it may or may not be solvable.
    (D) A decidable problem may or may not run in reasonable time but is not solvable.

54. Which of the following is NOT true about a program?
    (A) Instructions may involve variables which may change or be output from the program.
    (B) Instructions are processed sequentially.
    (C) A program always has a return value.
    (D) A program automates processes in a computer.

55. Imagine you want to create a procedure to find and print the smallest item in a list. Take the code below for example:

```
PROCEDURE showMin(aList)
{
  min 0
  FOR EACH item IN aList
  {
    if (min > item)
    {
     min ← item
    }
  }
  DISPLAY("smallest item in list is " + min)
}
```

In what situation would this procedure fail to correctly display the minimum?
    (A) In no situation; this procedure works as intended

(B) In all situations; this procedure will DISPLAY the maximum, not the minimum
(C) If every item in the list is positive
(D) If every item in the list is negative

56. Which of the following is NOT true about abstraction?
(A) Abstraction reduces or removes details to help understand something new.
(B) A lower-level abstraction is less specific.
(C) Abstraction helps you manage the details and code of a program.
(D) Lower-level abstractions can be combined to make higher-level abstractions.

57. Which of the following is NOT true?
(A) All digital data is an abstraction.
(B) All data eventually becomes binary digits (bits) that the computer interprets.
(C) Programming commands are a potential source of bits.
(D) Abstractions occur only in hardware applications.

58. Which of the following number systems is NOT used in a computer program?
(A) Binary (base 2)
(B) Tertiary (base 3)
(C) Hexadecimal (base 16)
(D) Decimal (our number system)

59. Which of the following is true?
(A) Converting data usually comes at a cost.
(B) Data is never lost in conversion.
(C) Data is never changed in conversion.
(D) Data can always be converted without a loss.

60. Which of the following is most likely an example of an overflow error?
(A)
```
z ← ⅓
```
(B)
```
z ← 1/0
```
(C)
```
nums ← (1, 2, 3)
n ← 0
REPEAT 4 TIMES
  n ← n + 1
  DISPLAY(nums(n))
```
(D)
```
n ← 0
REPEAT UNTIL NOT n = 0
  n ← n * 100
```

61. Which of the following correctly converts 167 to the binary number system? (Hint: Binary numbers have place values that are powers of 2.)
(A) 11100101

(B) 10100111
(C) 0000111
(D) 1010101

62. Which of the following statements is true?
    (A) Problems that have a “yes” or “no” answer for all inputs are called *decidable*.
    (B) Problems that have a “yes” or “no” answer for all inputs are called *undecidable*.
    (C) Undecidable problems always have a solution.
    (D) Problems that cannot be solved with an algorithm are called *solvable*.

63. Algorithms will exponential behavior (e.g. x^n) are:
    (A) Expected to run in reasonable time
    (B) NOT expected to run in reasonable time
    (C) Impossible to calculate
    (D) Easier to do by hand

64. Which of the following samples of code correctly swaps the values of variables `a` and `b`?
    (A)
    ```
    a ← b
    b ← a
    ```
    (B)
    ```
    val ← a
    val ← b
    b ← a
    ```
    (C)
    ```
    val ← b
    b ← a
    a ← val
    ```
    (D)
    ```
    b ← a
    b ← val
    a ← val
    ```

65. Data compression that allows for all of the original data to be retrieved is called:
    (A) Lossy
    (B) Lossless
    (C) Data manipulation
    (D) Sticky

66. A group of two or more systems linked together is called:
    (A) The internet
    (B) A network
    (C) A model
    (D) Memory

67. The ability for a computer to learn without being explicitly programmed is called:
    (A) Data manipulation

(B) Memory
(C) Phishing
(D) Machine learning

68. A set of computer instructions assembled to help create, analyze, understand, and/or solve problems or automate a process is called:
(A) A program
(B) A proxy server
(C) A heuristic
(D) A hypothesis

69. Which of the following statements are true regarding compressing files?
(A) If lossless compression is applied, every single bit of data that was originally in the file remains after the file is uncompressed.
(B) No matter what compression technique is used, once a data file is compressed, it cannot be restored to its original state.
(C) The amount of data reduction possible using lossy compression is often much lower than through lossless techniques.

70. What is the value of `n` after the above code executes?

```
i ← 1
n ← 2
REPEAT until i = 4
{
   n ← n * 2
   i ← i + 1
}
```

(A) 12
(B) 0
(C) 16
(D) 22

71. Which of the following is most likely to be a part of a phishing attack?
(A) Someone using your social media information to show you specific advertisements.
(B) Someone requesting your personal information through an online chat room.
(C) Clicking a button that results in all of your passwords being open to hackers.
(D) Having all of your email accounts deleted from too many failed login attempts

72.

```
i ← 1
REPEAT UNTIL i ≤ n
   IF i MOD 2 = 1
```

```
        DISPLAY("ODD")
    ELSE
        DISPLAY("EVEN")
    i <- i + 1
```

I. "ODD" is printed n/2 times if n is even
II. "ODD" is printed (n + 1)/2 times if n is odd
III. "EVEN" is printed (n - 1)/2 times if n is odd

Which of the following statements are true?

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

73. Which of the following statements are true about algorithms?

I. If an algorithm runs in reasonable time, the number of steps the algorithm takes is a polynomial function (constant, linear, squared, etc.) of the size of the input.
II. All problems can be solved using an algorithm that runs in reasonable time.
III. If a problem cannot be solved in reasonable time, a heuristic approach is helpful to solve the problem.

(A) I and III
(B) I only
(C) I and II
(D) All answers are true

74. A student purchases a single-user license of an online textbook and wants to share the textbook with their classmates. Under what conditions is it acceptable for the student to share this textbook?

(A) If the student shares only three chapters of the textbook with their classmates
(B) If the student gets permission from textbook's editor
(C) If the student gets permission from the textbook's copyright owner
(D) If the textbook is only shared with one other classmate