AP Computer Science Principles: Practice Exam 2

Answers and Explanations

1. **C**—The number was larger than the computer could handle resulting in an overflow error.

2. **B**—The way floating point numbers are stored can cause rounding errors. The employee sent the fractional part of numbers to the separate account and it accumulated over time. For example, if the number was $1.988889, then $ 0.008889 could be sent to the extra account.

3. **A**—Take the hexadecimal number and convert each individual number to its binary equivalent using 4 bits.

   `E → 14 → 1110  8 → 1000`

   Then convert the binary number to decimal. Write the table for the powers of 2 on the side of your paper so you do not make an error. For every column there is a 1 in the binary number, add the corresponding value of 2^x.

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1
1	1	1	0	1	0	0	0

   $128 + 64 + 32 + 8 = 232_{10}$

4. **C**—You need to convert the number for each color from decimal to hexadecimal: 75 for Red, 156 for Green, 211 for Blue. First convert the decimal number to binary.

   75_{10} = 0100 1011_2 156_{10} = 1001 1100_2
   211_{10} = 1101 0011_2

   Then convert the binary to the hexadecimal equivalent using the 4 bits shortcut.

   ```
   Red: 4  11 → 4B   Green:  9 12 → 9C
   Blue: 13 3 → D3
   ```

   ```
   RGB (75, 156, 211) = #4B9CD3
   ```

5. **C**—A procedure that can be called to check availability is the best solution. It avoids duplication of code and does not force the student to pick a time.

6. **C**—The program should display available times so people can see if the time they want is available. They can then request a time. The app should check to ensure the time has not already been taken since multiple people can use the app at the same time. Then the reservation can be recorded and the list of available times updated.

7. **C**—If the song has already been played 100 times, it will be removed from the list topSongs. Otherwise, it will be played and the number of times played will increase by 1.

8. **D**—The number of times the song has been played is still set to 100, so even after the user adds it back to the list, then the next time it is played, both conditions in the IF statement will be true and it will be removed again. Resetting it back to 0 after it has been removed from the list is the best way to resolve the problem.

9. **D**—The number bird strikes are not needed to practice typical take-offs and landings.

10. **D**—A string is a text field so the binary numbers will represent letters. Find the binary number on the table and then the corresponding letter associated with it.

11. **C**—The first and third conditions evaluate to be false. The only time an OR condition is false is when both are false, and the NOT operator takes the opposite of the value so true would become false and false would become true.

12. **B**—Only the second condition evaluates to true. Both values must be true with an AND to be true, and one or both need to be true with an OR for it to be true.

13. **D**—Metadata is data about data, and the number of data fields volunteers track is about the data. The other fields are data about the sea turtle nests.

14. A—Only the lossless compression technique will allow the original uncompressed video to be restored for the scientists to review.

15. C—Services use the location tracker on your device. There would have been a pop-up asking for permission to use your location. If you clicked OK, then you will hear and see local ads.

16. D—All of the methods can be used with further analysis.

17. B—Publishing the results in an easy to view format on a vetted website is the best method.

18. A—Transmitting company data back and forth is a security concern and encryption of the data is important to keep company data about customers, employees, and trade secrets secure.

19. A—Sending transaction data off-site can present a security concern if the data is not encrypted. Public key encryption has not been broken and is the standard today.

20. D—A team with diverse skills and backgrounds can result in a better product in a collaborative environment.

21. A—Server farms can provide solutions that can grow as needs grow.

22. A—Smaller data sets may not have enough data to identify patterns or true trends.

23. B—The Internet has an end-to-end architecture because packets are created by breaking the information into smaller segments at one end (the sender's), and are reassembled at the other end (the receiver's).

24. D—Packets travel along many different paths to reach their final destination. They arrive out of order and are then reassembled at the destination.

25. A—Protocols are rules that are followed to ensure data can communicate across all equipment.

26. A—The top-level domain is the highest level in the Domain Name System and is at the far right of a website name. The second-level domain is to the left of the top-level domain and the third-level domain is to the left of the second-level domain.

27. A—Bandwidth measures the amount of data that can be transmitted in a specific amount of time. Therefore, knowing how much data needs to be downloaded on a regular basis is a key measurement.

28. A—Phishing scams can make a website look very realistic. To be sure you are at an authentic website, search to find the link yourself or type it into your browser rather than clicking on a link.

29. C—A Distributed Denial-of-Service (DDoS) attack is one that floods a website with requests in an attempt to cause it to crash.

30. B—Brute force techniques try every solution to try and break through the protection around encrypted data.

31. D—The data should be moved to the cloud so all employees can access it any time with an Internet connection.

32. C—Fault tolerance means the Internet will continue to function and re-route packets when parts of it are down.

33. D—This is not an available assistive technology.

34. D—Crowdsourcing is used in many ways and more are coming into use. Helping people find available jobs is one use.

35. A—Companies should take the findings from the data-mining results and make strategic decisions to determine when and how to take advantage of the new information. The other decisions can be made based on current sales and projections and do not need data-mining techniques.

36. A—To protect intellectual property, the Digital Millennium Copyright Act works to prevent illegal file sharing, illegal downloads, and licensing violations.

37. D—Both blocks of code have an error. The first is an infinite loop, and Block 2 will add the new name multiple times.

38. A—The MOD operator returns the remainder when two numbers are divided. If a number is divided by 2 and the remainder is zero, then it is an even number.

39. C—The binary search is most efficient as a divide-and-conquer algorithm because half the data can be removed with each iteration of the search. The item can be found or determined that it is not in the dataset in a minimal number of passes.

40. D—Booleans can only be true or false; D is the only option that does not evaluate to true or false.

41. D—The code only includes test scores that are greater than 0. Test1 scores have a 0 that will not be included in the average, but it should. The IF statement should be removed to correctly calculate test averages in all cases.

42. D—Neither algorithms will correctly track if a locker is an even number (top locker) or an odd number (bottom locker).

43. C—The file should be sorted and duplicates removed; then it is ready for processing.

44. A—A heuristic is finding the best approximate solution when the actual solution is intractable.

45. C—FOR EACH loops will run for each element in a list.

46. C—To test if a number is even, you can use MOD with 2 and a remainder of 0 means it is even. Use less than "<" to determine if a number is less than another. Use AND for both conditions to be true to select the number. Be sure to use the correct variable, "num", to test the conditions.

47. D—Iterative code will loop until every item in the list is checked and a selection statement is needed to determine if a number is positive.

48. A—Tractable algorithms run efficiently for large and small data sets while intractable algorithms cannot run efficiently for large datasets.

49. D—Readability is a feature of algorithms that are clear and easy to understand. Every feature except D helps others understand what its intended purpose is. Loops should be used to shorten the code which makes it more readable.

50. D—The selection criteria must be false for the code associated with an ELSE to run.

51. B—Option B compares the time first, and if equal, it then checks the am/pm indicator.

52. C—This diagram starts and ends in the correct block facing in the correct direction. Remember that rotating left three times is the same as a right turn and rotating right three times is the same as a left turn.

53. C—The temporary variable is assigned the value at the end of the list. Then the last element can be assigned the value in the first position. Finally, the first position in the list is assigned the value in the temporary variable.

54. B—checkUp is set to true if miles ≥ 4999. Since miles is 4999, checkUp will be true.

55. D—The binary number = 93_{10}, the hexadecimal number = 94_{10}, so the numbers in ascending order go from decimal (72), binary (94), hexadecimal (95).

56. C—The amount of change due calculates a negative number. The calculation should be amtPaid – cost rather than cost – amtPaid.

57. D—The ELSE condition will run because hours is not greater than 40. Therefore, the program will display answer D.

58. D—The criteria for the REPEAT loop is incorrect. It must be a constant or a variable holding an integer value, not a Boolean value.

59. D—The only time the animal is displayed is when it is a fish.

60. C—The length of the list, pets, is 6 as there are 6 elements in it.

61. C—The INSERT command moves current values over a position each time.
The REMOVE command shifts list values to the left.
After these commands, pets[3] = dogfood

62. C—Privacy of your personal data is the main concern with the use of cookies. Since cookies track your browsing activity, others can access the information stored in them.

63. A—None of the other options will produce better or even code that works.

64. C—The only information that cannot be determined from the table is if it rained on days that were 80 degrees F or warmer.

65. C—The block of code calculates the current inventory, change owed if any, and the additional amount to pay, if any. It does not calculate the tax rate. That is provided and used to calculate the total amount due.

66. B—The code starts and stops in the correct block facing the correct direction. Remember that rotate blocks do not move forward. They rotate the direction within the current block.

67. A, B—Processing a list from the beginning to the end or the end to the beginning with the same code in each to find and count the elements that start with an "a" will produce the same results. A merge search does not exist (but a merge sort does). The local variable that counts the words would not be available outside of the procedure.

68. B, C—If one variable counts the number of door openings and closings, then modular math, which gives the remainder after division, can determine if a number is even or odd. An odd number would mean a door is open. Option C uses two variables for the same door, one to count the number of times a door opened and the other records the number of times it closed. If these are not the same, then a door is open and the alarm cannot be set.

69. A, D—The simulation can show if the lunch line will speed up and if a new bottleneck will be created at the pick-up line. The simulation will not show how often the app will be used or if food will be wasted.

70. C, D—Cloud-based storage can be accessed from any locations with an Internet connection and is a good solution for storage when people are in different locations. Video conferences will help the collaboration effort.

71. A, C—With training, "citizen scientists" can provide a wealth of data over longer periods of time and they could be anywhere in the world creating more data from a variety of locations.

72. A, B—If aggregation is not done accurately, trial data and available public information could be used to identify participants. Removing or changing all names will help protect identities. Too much public data is available for the zip code masking or grouping to protect people's privacy.

73. A, B—Both asynchronous and synchronous communication are enabled by the "cloud" or servers located remotely.

74. A, C—Online courses are now offered in many schools as an option for students seeking a course not offered in their school. A virtual field trip is also a possibility when an actual field trip is not possible. These new options resulting from technological innovations in education benefit students by providing new opportunities.