

CSCI 1112 Quiz 1 Study Guide

1. Compute the powers of two from 2^0 to 2^8 .
2. Explain why the base 2 logarithm predicts the maximum number of times a discrete set can be repeatedly subdivided in half.
3. With diminishing rainfall over the years, water reservoirs are stressed throughout the country. Imagine a scenario where half the preceding years rainfall is collected each year. If the local reservoir has 50 feet of water this year, in how many years will the depth be less than 1 foot? Model your answer with a mathematical equation. *Hint : approximate numbers are good enough.*
4. (4pts) You are given a 416 card deck (eight 52 card decks) of playing cards for blackjack. You divide the deck precisely in half resulting in two decks of 208 cards. You repeat this process again on each of the generated decks which results in you having four decks of 104 cards. Model this process with a simple mathematical expression and use that model to predict the maximum number of times you can repeat this process before ending up with decks consisting of either 1 or zero cards.
5. You are given a deck of 26 cards each with a different letter of the English alphabet on it. You divide the deck in half resulting in two decks of 13 cards each. You repeat this process resulting in four decks containing either 6 or 7 cards. If you continue to repeat this process, eventually you will end when you have a number of decks consisting of either 0 or 1 cards.
 - a. (2pts) Model this problem with a diagram that illustrates the number of times this process is repeated. One step in the process is considered subdividing all of the available decks into smaller decks.
 - b. (2pts) Model the same problem as in a. with a simple mathematical formula.
6. (2pts) You have found a crypto coin that is projected to double in value year over year for the next seven years. If the coin is currently worth \$0.20, the projection predicts it to be worth \$0.40 next year and \$0.80 the year after that, and so forth. Model the expected growth for this coin through seven years using either a diagram or mathematical formula.
7. (2pts) What two minimum pieces of information are required for every Java variable declaration?
8. (2pts) What is the default value assigned by Java to every variable if an initial value is not explicitly provided?
9. (2pts) Explain how Java handles assigning default values to variables if an initial value is not explicitly specified?
10. (2pts) A memory location contains the value 100. If the value at that location is interpreted as a boolean, what value will be produced?
11. (2pts) A memory location contains the value 0. If the value at that location is interpreted as a non-primitive, what value will be produced?
12. All Java types belong to one of two meta-types. What are the two “meta-types”?
13. The Java `int` type belongs to which “meta-type”?
14. Given the following Java variable declaration:

```
int[] x;
```

 - a. What type is being declared?
 - b. What meta-type does the above type belong to?
15. What meta-type does the Java `String` type belong to?

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16. (2pts) Give two examples of a primitive type.
17. (2pts) Give two examples of a non-primitive or reference type.
18. (2pts) All non-primitive variables contain the same kind of data. How is the value stored in a non-primitive type interpreted?
19. (2pts) Assuming an infinite universe, why would it be impossible to prove that life does NOT exist elsewhere in the universe?
20. (2pts) What does it mean to use a “proof by exhaustion” or “brute force” strategy?

Recall our simple computer that can only store, add, negate, and conditionally loop.

21. On this computer, why does the number of operations remain constant for the subtract function?
22. On this computer, why does the number of operations in the multiply function vary with the size of the parameters?