

CMPSC 101 – Test 1

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Read each question carefully. There is a total of 20 multiple choice questions worth 2 points each. Afterwards, complete 10 true/false questions worth a point each. Then 2 short answer questions worth 5 points each. Finally, complete a 40 point coding section.

A. Multiple Choice:

1. How many bits are in a byte?

- a. 16
- b. 12
- c. 8
- d. This depends on the programming language

2. Java is a strongly type programming language. What does this statement mean?

- a. White space is an important piece to the language
- b. Once a variable is created, it cannot be modified
- c. Variables at runtime are all constants
- d. Each variable has a specific type to which it belongs

3. All of the following are primitive variable types EXCEPT:

- a. String
- b. int
- c. float
- d. char

4. A “for-each” loop requires all of the following EXCEPT:

- a. A number iterator
- b. An array or other iterable object
- c. A body for the loop
- d. A colon between the array and the object/primitive type

5. Which of the following shows the correct usage of a widening cast?

- a. `int x = 20.05;`
- b. `int x = (String) 20.05;`
- c. `double x = 20;`
- d. `double x = (int) 20;`

6. In Java, math operators follow which order?

- a. PEMDAS
- b. Forwards
- c. Backwards
- d. Java does not have a specific order; this relies on computer’s software

7. What is the result of this code segment: `int x = ((6 + 4) / 5) % 1;`

- a. 0
- b. 1
- c. 10
- d. An error will occur

8. What is the result of this code segment: `double x = 10 / 3;`

- a. 4
- b. 3.33
- c. 3.0
- d. 3

9. All of the following are valid ways to create exactly one blank line in console EXCEPT:

- a. `System.out.println("");`
- b. `System.out.print("\n");`
- c. `System.out.print("");`
- d. All of these are correct

10. Unicode is a standard created for what purpose?

- a. Create a universal standard for languages across platforms
- b. Create world peace between nations
- c. Compile raw source code on different computers
- d. Change the size of certain variables; specifically floating point numbers

11. What does IDE stand for?

- a. Integrated Development Environment
- b. Integrated Development Editor
- c. Intelligent Development Environment
- d. None of the above

12. What is the difference between a float and a double?

- a. A float is able to store a floating point number while a double holds a whole number
- b. Only double can be converted into an integer
- c. A double can store more digits
- d. Only a float can be converted into an integer

13. What is a return type?

- a. The variable type returned from a function after it was run
- b. Which line of code a function will go to when it is finished
- c. The error code that results after an issue as been found
- d. Java does not use return types

14. Which of the following is the correct declaration for the "main" function?

- a. `public static void main(String args) {}`
- b. `public static int main(String[] args) {}`
- c. `public static int main(String args) {}`
- d. `public static void main(String[] args) {}`

15. How would you denote a function that has no return type?

- a. You cannot. Each function must have a return type
- b. Use the keyword "void"
- c. Leave out the return type and Java will automatically handle the end of the function
- d. Remove the "static" keyword

16. Which of the following loops has 3 parts in its syntax

- a. While loop
- b. For loop**
- c. For-Each loop
- d. Do-While loop

17. How do you determine the amount of elements in an array called users

- a. users.size()
- b. users.length()
- c. users.length**
- d. users.size

18. Modulo (%) is responsible for _____.

- a. Dividing two integer numbers
- b. Dividing two decimal numbers
- c. Checking to see if a string is a number
- d. Getting the remainder of a quotient**

19. If I pass a primitive type to a function with parameters and change the primitive type in that other function, what will happen to the original variable?

- a. It will change since they are the same variable
- b. It will not change since Java's primitive types are pass by value**
- c. It will change since Java is always pass by reference
- d. A syntax error will appear

20. What does the break keyword do?

- a. Stops a loop or switch statement**
- b. Stops the program from running
- c. Continues to the next iteration of a loop
- d. Nothing. I made this keyword up

B. True/False Section:

21. (T/F) Putting a function before the "main" function will result in a compilation error

22. (T/F) Reassigning a variable marked as "final" is NOT possible

23. (T/F) Variables must be declared inside a function

24. (T/F) Adding a backslash (\) will allow you to add quotations to a string

25. (T/F) A widening cast is done automatically while a narrowing cast must be specified

26. (T/F) Do-While loops are NOT guaranteed to run at least once

27. (T/F) All functions return a useable variable

28. (T/F) An integer can be casted to a character

29. (T/F) All arrays are objects

30. (T/F) Strings are not objects

C. Short Answer:

For this section, answer each completely and make sure to read through the question thoroughly.

31. Emily is trying to make a program that calculates the total cost of her meal and displays what went into the final cost. However, when she runs her program, the total cost on her personal calculator is \$27.55 while her code results in the total cost being \$26.99. Find the problem(s) with the following code snippet. Explain what you would do to fix it.

```
1. public class Driver {
2.
3.     final static double PERCENTAGE = 0.06;
4.
5.     public static void main(String[] args) {
6.         double original = 25.99;
7.         double taxes = getSalesTax(original);
8.         double total = original + taxes;
9.         System.out.println("Original: $" + original);
10.        System.out.println("Taxes: $" + taxes);
11.        System.out.println("Total: $" + total);
12.    }
13.
14.    // Returns sales tax based on an amount payed
15.    static double getSalesTax(double totalPaid) {
16.        return totalPaid * PERCENTAGE;
17.    }
18.
19. }
```

32. Jake believes that it would be much easier to put all of his code into the main function with the variables alongside it. Why might this be worse than separating his code into several functions? Additionally, what advice would you offer him to attain better code?

Generally speaking, it is best to split Java code into multiple functions and keep variables that are used in multiple functions in the global scope. There are many reasons for this:

- The use of multiple functions greatly improves the readability of the code and allows more space to add comments explaining what the code does.
- Using functions means that code segments that are used more than once do not have to be re-added inline, as they can just be called again where needed.
- Functions make it easier to program throughout multiple projects, as they can be extracted from old projects when the same functionality is required, or can be included in a personal library project.

The phrase 'Better Code' is incredibly subjective, and there are countless ways to improve code depending on Jake's intentions and requirements. However, a great start is to make sure that all non-obvious code is commented so that it can be re-visited or read by a different person without any trouble understanding it. Another great place to start is to take the advice written above – which is to keep code segmented into individual functions for different tasks.

From a performance perspective, it is important to understand the different data types for variables in Java, as a program's resource usage can be cut down considerably just by using the right datatype for each use-case, such as using a byte instead of an int, or a float instead of a double.

D. Free Code

33. You are responsible for making new grading software for a class. In this software, you will need three parallel arrays. They are as follows:

- An array with 5 Strings for student names
- An array with 5 doubles for total points scored
- An array with 5 doubles for total points possible (Should be filled with 100.0s when created)
- Remember: Bracket initializer arrays String[] ex = {"Hi", "Hello"};

Create a function that takes a String array as a formal parameter and fills the array with 5 student names. Then, create another function that takes any array of doubles as formal parameters, and fills the array with any points

scored of your choice. There should only be two extra functions outside of your main function at this point. You may decide what values go into each array.

Create one additional function that returns a String letter grade based on a double value sent over in parameters. You may decide how this works. (Hint: Assignment-2.1)

After you've used each function and each array is filled, output the student's name, grade percentage, and letter grade in rows with either a for loop or a while loop.

Submission: <https://github.com/SuperslowJelly/Exam-1/blob/main/src/com/jelly/Main.java>