

Birkbeck
(University of London)
Software and Programming 1
In-class Test 1.1
13 Feb 2020

Student Name _____
Student Number _____

Answer all questions

1. Consider the following sequence of Java statements:

```
int i = 2;  
int k = 13 % i;  
i = 20 * -k + i * k * 42 - i;  
k = 32 / i + i * 2;
```

What is the value of k after these statements are executed? Show your workings. (7 marks)

Answer:

Workings:

2. Given variables `speed` of type `int` and `direction` of type `String`, write an expression of type `boolean`, which is evaluated to `true` if the speed is above 21 and `direction` is "N", "NE" or "NW", and to `false` otherwise. (7 marks)

Answer:

3. How many iterations do the following loops carry out? Assume that `i` is not changed in the loop body.

(a) `for (int i = 0; i <= 100; i += 3) ...`

(b) `for (int i = 100; i > 0; i -= 2) ...`

(4 marks)

Answer:

4. Which of the following are valid Java identifiers (i.e., possible names of variables/methods)? Note that `0` is a digit (zero) and `O` is a letter.

- (a) `string`
- (b) `repeat`
- (c) `Byte`
- (d) `foreach`
- (e) `len`
- (f) `0xFF`
- (g) `xFF`

(7 marks)

Answer:

5. Identify and explain five compile-time errors in the following Java code:

```
1 import java.util.Scanner;
2 public class foo_bar {
3     public static main(String[] args) {
4         double sum = 0;
5         int count = 0;
6         Scanner s = new Scanner(System.in);
7         for (boolean DONE = false; !DONE; DONE = DONE)
8             System.out.println("Input a number: ");
9             double num = s.nextDouble();
10            if (num <> 0) {
11                sum += num;
12                count++;
13            }
14            else
15                DONE = True;
16        }
17        System.out.println("Average: " + num / count);
18    }
19 }
```

How would you correct the errors you have found (with as few changes as possible)?

(10 marks)

Answer:

6. Implement a method `getState` to determine whether water is liquid, solid (ice) or gaseous at the sea level given the temperature value and the string "C" for Celsius and "F" for Fahrenheit. The method should take one argument of type `double` and one argument of type `String` and return a `String` according to the following table:

Celsius	Fahrenheit	
below 0	below 32	solid
0–100	32–212	liquid
above 100	above 212	gaseous

If the second argument is different from "C" and "F", then the method should return the empty `String`.

(15 marks)

Answer:

7. What is printed as a result of executing the following fragment of code?

```
int i = 2;
int k = i + 5;
while (k < 16) {
    i = i + 2;
    System.out.println(k - 5);
    k = i + 5;
}
```

Show your workings.

(10 marks)

Answer:

Workings:

8. What are the type and the value of the following expression

```
scale.equals("F") && (t - 32) * 5 / 9.0 > 100 ||
scale.equals("C") && t > 100 ? "steam" : "no steam"
```

with the following declarations: String scale = "C"; int t = 92;?

(5 marks)

Answer:

9. Implement a method that returns `true` if its argument of type `int[]` (array of integers) is a sequence of numbers 0, 1 and 3 that contains at least one occurrence of 0. For example, it should return `false` on `{1, -1, 1}`, `{1, 2}`, `{}`, `{1, 0, 2}`, and `{3, 1}`, but `true` on `{1, 0, 3}` and `{0}`. (15 marks)

Answer:

10. (a) Transform the for loop in the following fragment of code into a while loop.

```
int points = 0;
for (int d = 0; d < g.length/2; d++)
    if (g[d*2 + 1] > g[d*2])
        points += 3;
    else if (g[d*2 + 1] < g[d*2])
        points += 1;
System.out.println("points: " + points);
```

(b) Suppose that `g` is declared as follows: `int[] g = { 0, 2, 3, 1, 1, 1 };`. What is printed out as a result of executing this fragment of code? Show your workings. (20 marks)

Answer: