Birkbeck
(University of London)
Software and Programming 1
In-class Test 1.2
13 Feb 2020

Student Name _____

Student Number _____

Answer all questions

1. Consider the following sequence of Java statements:
   ```
   int i = 2;
   int k = 11 % i;
   i = -i + 20 * -k + i * k * 21;
   k = 42 / 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 below `20` and `direction` is `"S"`, `"SE"` or `"SW"`, 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 += 4) ...`
   (b)   `for (int i = 100; i > 0; i-= 3) ...`

                                                                   (**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)   `scanner`
   (b)   `until`
   (c)   `Int`
   (d)   `type`
   (e)   `main`
   (f)   `Ox00`
   (g)   `x00`

                                                                   (**7** marks)

Answer:

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

```java
1  import java.util.Scanner;
2  public class foo_bar {
3      public static int main(String[] args) {
4          double sum = 0;
5          Scanner s = new Scanner(System.in);
6          boolean done = False;
7          while (not done) {
8              System.out.println("Input a number: ");
9              double num = s.nextDouble();
10             int count = 0;
11             if (num != 0)
12                 sum += num;
13                 count++;
14             }
15             else
16                 done = true;
17         }
18         System.out.println("Average: " + sum / count);
19     }
20 }
```

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

(**10** marks)

Answer:

6. Implement a <u>method</u> `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 + 7;
while (k < 18) {
    i = i + 2;
    System.out.println(k - 7);
    k = i + 7;
}
```

Show your workings.   (**10** marks)

Answer:

Workings:

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

```
scale.equals("C") && t * 9 / 5.0 + 32 > 212 ||
scale.equals("F") && t > 212 ? "steam" : "no steam"
```

with the following declarations: `String scale = "F"; int t = 200;`?   (**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: