Birkbeck
(University of London)
Software and Programming 1
In-class Test 1.1
14 Feb 2019

Student Name _____
Student Number _____

Answer all questions

1. Consider the following sequence of Java statements:

```
int p = 10;
int q = 43 % p;
p = 16 + p / q * 2 - q * 2;
q = 32 / p - p * 2;
```

What is the value of `q` 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 between `14` and `23` (inclusive) and `direction` is either `"SW"` or `"W"`, 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 = 100; i > 0; i--) ...`

   (b) `for (int i = -100; i <= 100; i += 2) ...`

(**4** marks)

Answer:

4. Which of the following are valid Java identifiers (i.e., possible names of variables/methods)?

   (a) `DOUBLE`
   (b) `for_each`
   (c) `length`
   (d) `007`
   (e) `var`
   (f) `byte`
   (g) `return`

(**7** marks)

Answer:

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

```
public Class foo_bar {
   public static int print_intervals(int[] starts, int[] ends) {
      int min = starts[0], max = ends[0];
      for (int i = 1; i < starts.length(); i++) {
         if (ends[i] > max + 1, starts[i] > max + 1) {
            System.out.println("new interval:  " + min + ", " + max);
            min = starts[i];
         }
         max = max > ends[i] ?  (max : ends[i]);
      }
   }
}
```

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

(**10** marks)

Answer:

6. Implement a method `getWindDirection` to determine the cardinal direction of the wind given the azimuth degrees. The method should take one argument of type `int`, the azimuth, and return a `String`, the cardinal direction, according to the following table:

0–44	North
45–134	East
135–224	South
225–314	West
315–359	North

If the argument is not covered by the table, the method should return the empty `String`.

(**10** marks)

Answer:

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

```
int i = 2;
int k = i + 1;
while (k < 14) {
   i = i + 2;
   System.out.println(k - 3);
   k = i + 3;
}
```

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

Answer:

Workings:

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

```
type.equals("iPhone") && v >= 6 ||
    type.equals("Mac") && v / 100.0 >= 10.9 ? "iMessage" : "none"
```

with the following declarations: `String type = "Mac"; int v = 1080;`? (**5** marks)

Answer:

9. Implement a method that returns `true` if its argument of type `String` is a sequence of letters `W`, `L` and `D` that contains at least one occurrence of `L`.
   For example, it should return `false` on `"WXL"`, `"T"`, `""` and `"WWW"`, but `true` on `"WLD"` and `"WLLLD"`. (**20** marks)

Answer:

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

```
String r = "";
for (int c = 0; c < s.length; c += 2)
   if (s[c + 1] > s[c])
      r += "W";
   else if (s[c + 1] < s[c])
      r += "L";
   else
      r += "D";
System.out.println("result: " + r);
```

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

(*c*) Explain the action of this fragment of code (for an array `s` of integers of even length).

(**20** marks)

Answer:

