Tutorial 6

You will be expected to engage with the tutor and discuss solutions to the problems presented here. The content covered in the tutorials will assist in your understanding of the practical requirements for the checkpoints.

1. Do you have a good grasp of:

i. what a **variable** is, how it can be declared and initialised in one step, or declared and assigned a value later, and what roles it plays

ii. how **instance variables** differ from **local variables**,

iii. what a **method** is, how methods are defined and called,

iv. what **parameter passing** is and why it is useful,

v. what a **class** is and what roles classes have,

vi. how a **statement** differs from an **expression** and in what context each is appropriate,

vii. how a **static** (or class) variable differs from an **instance** variable,

viii. what an **object** is and how its elements are accessed,

ix. what **iteration** (repetition) is and how it is supported by Java,

x. how do **logical** operators differ from **arithmetic** operators, and

xi. what **boolean** values are and how they are used?

If the answer is 'no' to any of the above, ask your tutor to explain the concept and to give examples illustrating its application. The above list is not exhaustive – ask about any other concept which is not clear to you.

2. Write a service method called `randomInRange` that takes in two numbers representing a range. Print an error message and return zero if the second parameter is less than the first. Otherwise, the method should return a randomly generated integer in that range (inclusive). You may assume that the class has a `Random` object called `generator` already declared and initialised.

3. Rewrite the following code segment using a `switch` statement:

```
if (x == 0) {
  y = 3;
  System.out.println("Zero");
} else if (x == 1) {
  System.out.println("One");
} else {
  System.out.println("Other");
}
```

4. Rewrite the following `for loop` as a while loop.

```
for (int i = 0; i < MAX; i++) {
  //loop body
}
```

5. Given the following method declaration, what would be the output from the method call `mystery(10, 5);`?

```
public void mystery(int num1, int num2) {
  int total = num2 + num1 / num2 % num1 * num2;
  for(int i = 0; i < total; i+=5) {
    for(int j = 1; j <= i; j++)
      if(total % j == 0)
        System.out.print(j + " ");
    }
}
```

6. Write a `do` loop that verifies that the user enters an odd value. You may assume that a `Scanner` object called `input` has already been created.

7. Write a code fragment that determines how many times the character `'A'` appears in a String object called `name`.

8. Rewrite the following code segment using a `switch` statement:

```
if (c == 'a' || c == 'b') {
  System.out.println("a or b");
} else if (c >= 'p' && c <= 's') {
  System.out.println("p..s");
} else {
  System.out.println("Other");
}
```

9. What output is produced by the following code fragment?

```
for (int val = 200; val >= 0; val -= 1)
  if (val % 4 != 0)
    System.out.println(val);
```

10. Transform the following `while` loop into an equivalent `do` loop (make sure it produces the same output).

```
int num = 1;
while (num < 20) {
  num++;
  System.out.println(num);
}
```

11. Transform the `while` loop from the previous exercise into an equivalent `for` loop (make sure it produces the same output).

12. Write a `for` loop to print the odd numbers from 1 to 99 (inclusive).

13. Write a `for` loop to print the multiples of 3 from 300 down to 3.

14. Write a code fragment that reads 10 integer values from the user and prints the highest value entered.

15. Write a method called `powersOfTwo` that prints the first 10 powers of 2 (starting with 2). The method takes no parameters and doesn't return anything.