Practical 3

Testing and Coverage

This practical has one task that comprises writing tests to ensure an acceptable level of coverage of the implemented code.

To check coverage, you can use the **`Run | Run with Coverage`** option from the IntelliJ menu. This option will become available once you have written at least one test.

You should familiarise yourself with the code and its operation before testing the solution, and also the original specifications if required.

The only classes not suitable for testing, and therefore no tests will be necessary, are the **`Item`** and **`Remind`** (driver) classes.

There is no requirement to test **private** methods, and you should not alter any of the original code to perform tests (see below for an example of redirecting input and output).

You should aim for a minimum of 85% coverage of all code that is able to be tested.

Many of the methods are `void` methods and will require you to implement a way to redirect input and output.
The following code will assist you to do this.

```
private final PrintStream standardOut = System.out;
private final InputStream systemIn = System.in;
private final ByteArrayOutputStream outputStreamCaptor = new ByteArrayOutputStream();
```

Then in your test methods you can assign as follows:

```
System.setOut(new PrintStream(outputStreamCaptor));
 InputStream inputStream = new ByteArrayInputStream(input.getBytes());
 System.setIn(inputStream);
 RUN YOUR METHOD HERE
 String expected = output.trim().replace("\r\n", "\n");
 String actual = outputStreamCaptor.toString().trim().replace("\r\n", "\n");
 assertEquals(expected, actual);
```

The `trim().replace("\r\n", "\n")` is used to ensure consistency in output across different architectures

Any other questions regarding this can be addressed at the practical session.

A complete test is shown below:

```java
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.Test;
import org.junit.jupiter.params.ParameterizedTest;
import org.junit.jupiter.params.provider.CsvSource;

import java.io.ByteArrayInputStream;
import java.io.ByteArrayOutputStream;
import java.io.InputStream;
import java.io.PrintStream;

import static org.junit.jupiter.api.Assertions.assertEquals;

class MemoTest {

    private final PrintStream standardOut = System.out;
    private final InputStream systemIn = System.in;
    private final ByteArrayOutputStream outputStreamCaptor = new ByteArrayOutputStream();

    @ParameterizedTest(name = "Testing memo print - Test {index} - in and out:
{arguments}")
    @CsvSource(value = {"Today is good, memo: Today is good"})
    public void testPrint(String input, String output) {
        System.setOut(new PrintStream(outputStreamCaptor));
        InputStream inputStream = new ByteArrayInputStream(input.getBytes());
        System.setIn(inputStream);
        Memo memo = new Memo(input);
        memo.print();
        String expected = output.trim().replace("\r\n", "\n");
        String actual = outputStreamCaptor.toString().trim().replace("\r\n", "\n");
        assertEquals(expected, actual);
    }
    @AfterEach
    void tearDown() {
        System.setIn(systemIn);
        System.setOut(standardOut);
    }
}
```