**JUnit Testing Exercises**

**Exercise 1: Setting Up Junit**

**Calculator.java**

package com.example;

public class Calculator {

public int add(int a, int b) {

return a + b;

}

public int subtract(int a, int b) {

return a - b;

}

}

**CalculatorTest.java**

package com.example;

import org.junit.Test;

import static org.junit.Assert.assertEquals;

public class CalculatorTest {

@Test

public void testAdd() {

Calculator calc = new Calculator();

int result = calc.add(3, 7);

assertEquals(10, result);

}

@Test

public void testSubtract() {

Calculator calc = new Calculator();

int result = calc.subtract(10, 4);

assertEquals(6, result);

}

}

**Exercise 3: Assertions in JUnit**

**AssertionsTest.java**

import org.junit.Test;

import static org.junit.Assert.\*;

public class AssertionsTest {

@Test

public void testAssertions() {

assertEquals(5, 2 + 3);

assertTrue(5 > 3);

assertFalse(5 < 3);

assertNull(null);

assertNotNull(new Object());

}

}

**Exercise 4: Arrange-Act-Assert (AAA) Pattern, Test Fixtures, Setup and Teardown Methods in Junit**

**CalculatorAAATest.java**

package com.example;

import org.junit.Before;

import org.junit.After;

import org.junit.Test;

import static org.junit.Assert.\*;

public class CalculatorAAATest {

private Calculator calculator;

@Before

public void setUp() {

calculator = new Calculator();

System.out.println("Setup complete");

}

@After

public void tearDown() {

calculator = null;

System.out.println("Teardown complete");

}

@Test

public void testAddition() {

int a = 10;

int b = 5;

int result = calculator.add(a, b);

assertEquals(15, result);

}

public void testSubtraction() {

int a = 10;

int b = 4;

int result = calculator.subtract(a, b);

assertEquals(6, result);

}

}

**Mockito exercises**

**Exercise 1: Mocking and Stubbing**

import static org.mockito.Mockito.\*;

import static org.junit.jupiter.api.Assertions.\*;

import org.junit.jupiter.api.Test;

import org.mockito.Mockito;

public class MyServiceTest\_Mocking {

public interface ExternalApi {

String getData();

}

public class MyService {

private ExternalApi api;

public MyService(ExternalApi api) {

this.api = api;

}

public String fetchData() {

return api.getData();

}

}

@Test

public void testExternalApiMockingAndStubbing() {

ExternalApi mockApi = Mockito.mock(ExternalApi.class);

when(mockApi.getData()).thenReturn("Mock Data");

MyService service = new MyService(mockApi);

String result = service.fetchData();

assertEquals("Mock Data", result);

}

}

**Exercise 2: Verifying Interactions**

import static org.mockito.Mockito.\*;

import org.junit.jupiter.api.Test;

import org.mockito.Mockito;

public class MyServiceTest\_Verification {

public interface ExternalApi {

String getData();

}

public class MyService {

private ExternalApi api;

public MyService(ExternalApi api) {

this.api = api;

}

public String fetchData() {

return api.getData();

}

}

@Test

public void testVerifyGetDataCalled() {

ExternalApi mockApi = Mockito.mock(ExternalApi.class);

MyService service = new MyService(mockApi);

service.fetchData();

verify(mockApi).getData();

}

}

**SL4J Logging Exercise**

**Exercise 1: Logging Error Messages and Warning Levels**

**pom.xml**

<dependencies>

<dependency>

<groupId>org.slf4j</groupId>

<artifactId>slf4j-api</artifactId>

<version>1.7.30</version>

</dependency>

<dependency>

<groupId>ch.qos.logback</groupId>

<artifactId>logback-classic</artifactId>

<version>1.2.3</version>

</dependency>

</dependencies>

**LoggingExample.java**

import org.slf4j.Logger;

import org.slf4j.LoggerFactory;

public class LoggingExample {

private static final Logger logger = LoggerFactory.getLogger(LoggingExample.class);

public static void main(String[] args) {

logger.error("This is an error message");

logger.warn("This is a warning message");

}

}

**Logback.xml**

<configuration>

<appender name="STDOUT" class="ch.qos.logback.core.ConsoleAppender">

<encoder>

<pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36} - %msg%n</pattern>

</encoder>

</appender>

<root level="debug">

<appender-ref ref="STDOUT" />

</root>

</configuration>

**Output:**

HH:mm:ss.SSS [main] ERROR LoggingExample - This is an error message

HH:mm:ss.SSS [main] WARN LoggingExample - This is a warning message