## Exercise 1: Setting Up JUnit

**Scenario:**  
You need to set up JUnit in your Java project to start writing unit tests.

**Steps:**

Create a new Java project in your IDE (e.g., IntelliJ IDEA, Eclipse).

Add the JUnit dependency to your project. If you are using Maven, add this to your pom.xml:

xml

CopyEdit

<dependency>

<groupId>junit</groupId>

<artifactId>junit</artifactId>

<version>4.13.2</version>

<scope>test</scope></dependency>

Create a new test class in your project.

## Exercise 2: Writing Basic JUnit Tests

**Scenario:**  
You need to write basic JUnit tests for a simple Java class.

**Steps:**

Create a Java class with methods to test:

java

CopyEdit

public class Calculator {

public int add(int a, int b) {

return a + b;

}

public int subtract(int a, int b) {

return a - b;

}

}

Write a JUnit test class:

java

CopyEdit

import org.junit.Test;import static org.junit.Assert.\*;

public class CalculatorTest {

@Test

public void testAdd() {

Calculator calc = new Calculator();

assertEquals(5, calc.add(2, 3));

}

@Test

public void testSubtract() {

Calculator calc = new Calculator();

assertEquals(1, calc.subtract(3, 2));

}

}

## Exercise 3: Assertions in JUnit

**Scenario:**  
You need to use different assertions in JUnit to validate your test results.

**Solution Code:**

java

CopyEdit

import org.junit.Test;import static org.junit.Assert.\*;

public class AssertionsTest {

@Test

public void testAssertions() {

// Assert equals

assertEquals(5, 2 + 3);

// Assert true

assertTrue(5 > 3);

// Assert false

assertFalse(5 < 3);

// Assert null

assertNull(null);

// Assert not null

assertNotNull(new Object());

}

}

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

**Scenario:**  
You need to organize your tests using the Arrange-Act-Assert (AAA) pattern and use setup and teardown methods.

**Steps:**

Write tests using the AAA pattern.

Use @Before and @After annotations for setup and teardown.

**Example Test Class:**

java

CopyEdit

import org.junit.Before;import org.junit.After;import org.junit.Test;import static org.junit.Assert.\*;

public class CalculatorTest {

private Calculator calculator;

// Setup method - runs before each test

@Before

public void setUp() {

calculator = new Calculator();

System.out.println("Setup: Calculator instance created");

}

// Teardown method - runs after each test

@After

public void tearDown() {

calculator = null;

System.out.println("Teardown: Calculator instance set to null");

}

@Test

public void testAdd() {

// Arrange

int a = 10;

int b = 20;

// Act

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

// Assert

assertEquals(30, result);

}

@Test

public void testSubtract() {

// Arrange

int a = 20;

int b = 5;

// Act

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

// Assert

assertEquals(15, result);

}

}