<u>Exercise 1: Setting Up JUnit Scenario:</u>

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

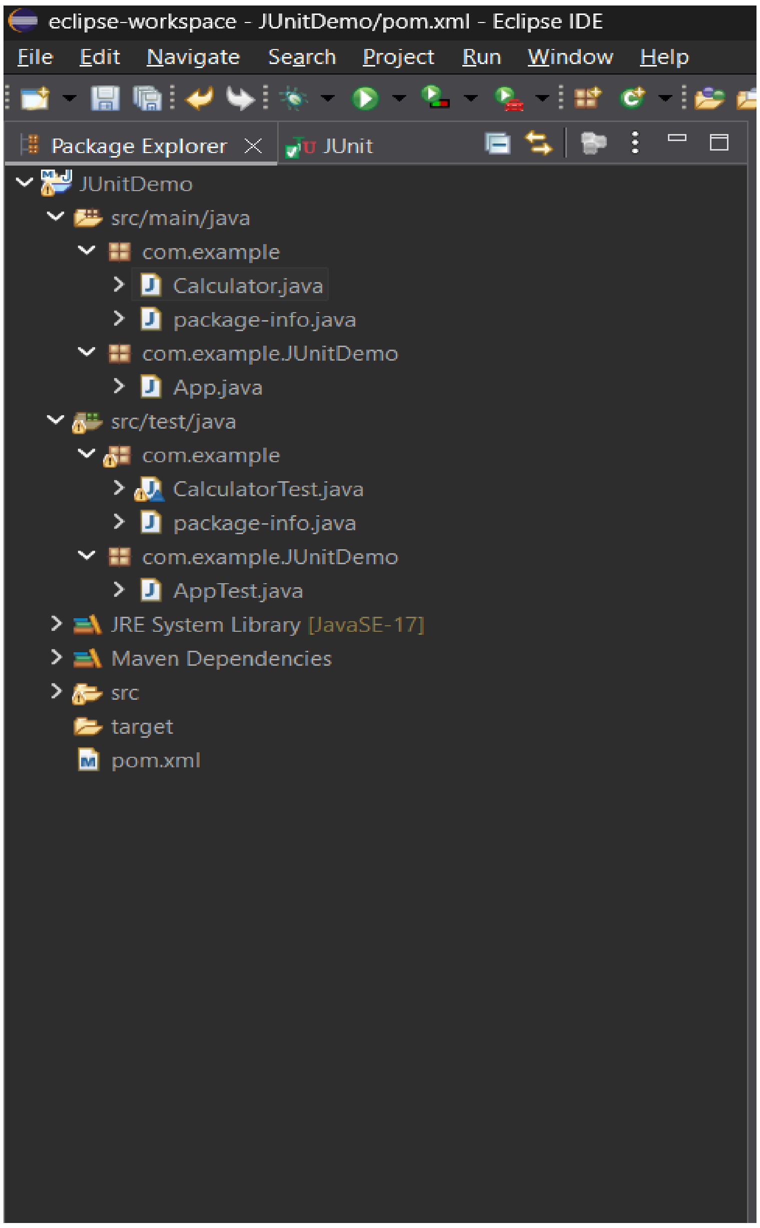
Steps:

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

2. Add JUnit dependency to your project. If you are using Maven, add the following to your pom.xml: junit junit 4.13.2 test

3. Create a new test class in your project.

<u>FOLDER STRUCTURE</u>


eclipse-workspace - JUnitDemo/pom.xml - Eclipse IDE
File Edit Navigate Search Project Run Window Help
Package Explorer
JUnit

```
JUnitDemo
  src/main/java
    com.example
      Calculator.java
      package-info.java
    com.example.JUnitDemo
      App.java
  src/test/java
    com.example
      CalculatorTest.java
      package-info.java
    com.example.JUnitDemo
      AppTest.java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  pom.xml
```

CODE

pom.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
                             http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>com.example</groupId>
  <artifactId>JUnitDemo</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <name>JUnitDemo</name>
  <url>http://www.example.com</url>
 <properties>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
    <maven.compiler.release>17</maven.compiler.release>
    <junit.jupiter.version>5.11.0</junit.jupiter.version>
  </properties>
 <dependencies>
   <dependency>
      <groupId>org.junit.jupiter</groupId>
      <artifactId>junit-jupiter-api</artifactId>
      <version>${junit.jupiter.version}</version>
      <scope>test</scope>
    </dependency>
     <dependency>
      <groupId>org.junit.jupiter</groupId>
      <artifactId>junit-jupiter-params</artifactId>
    <version>${junit.jupiter.version}</version>
    <scope>test</scope>
   </dependency>
   <dependency>
    <groupId>org.junit.jupiter</groupId>
    <artifactId>junit-jupiter-engine</artifactId>
    <version>${junit.jupiter.version}</version>
    <scope>test</scope>
   </dependency>
  </dependencies>
   <build>
   <plugins>
  <plugin>
     <groupId>org.apache.maven.plugins</groupId>
     <artifactId>maven-compiler-plugin</artifactId>
     <version>3.13.0</version>
     <configuration>
      <release>${maven.compiler.release}</release>
     </configuration>
    </plugin>
     <plugin>
     <groupId>org.apache.maven.plugins</groupId>
     <artifactId>maven-surefire-plugin</artifactId>
     <version>3.0.0-M9</version>
    </plugin>
   </plugins>
  </build>
</project>
```

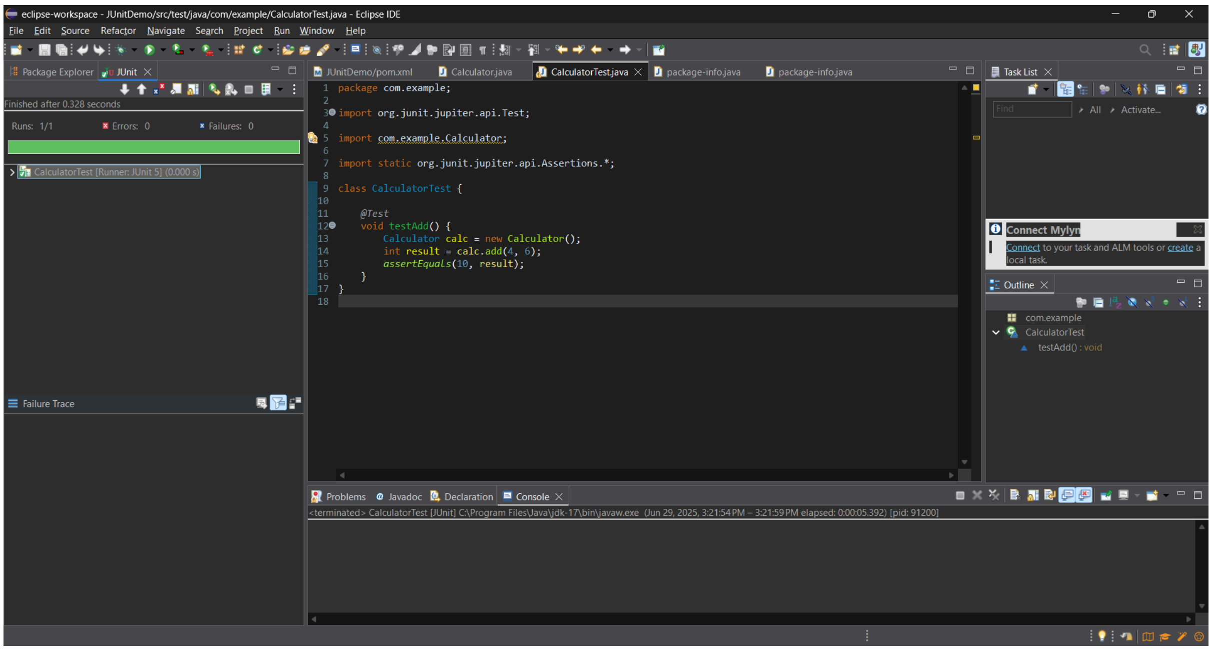
Calculator.java

```
package com.example;

public class Calculator {

    public int add(int a, int b) {

        return a + b;

    }

}
```

CalculatorTest.java

```
package com.example;

import org.junit.jupiter.api.Test;

import com.example.Calculator;

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

class CalculatorTest {

@Test

    void testAdd() {

        Calculator calc = new Calculator();

        int result = calc.add(4, 6);

        assertEquals(10, result);

    }

}
```

<u>OUTPUT</u>



eclipse-workspace - JUnitDemo/src/test/java/com/example/CalculatorTest.java - Eclipse IDE

```
Finished after 0.328 seconds
Runs: 1/1        Errors: 0        Failures: 0
CalculatorTest [Runner: JUnit 5] (0.000 s)
```

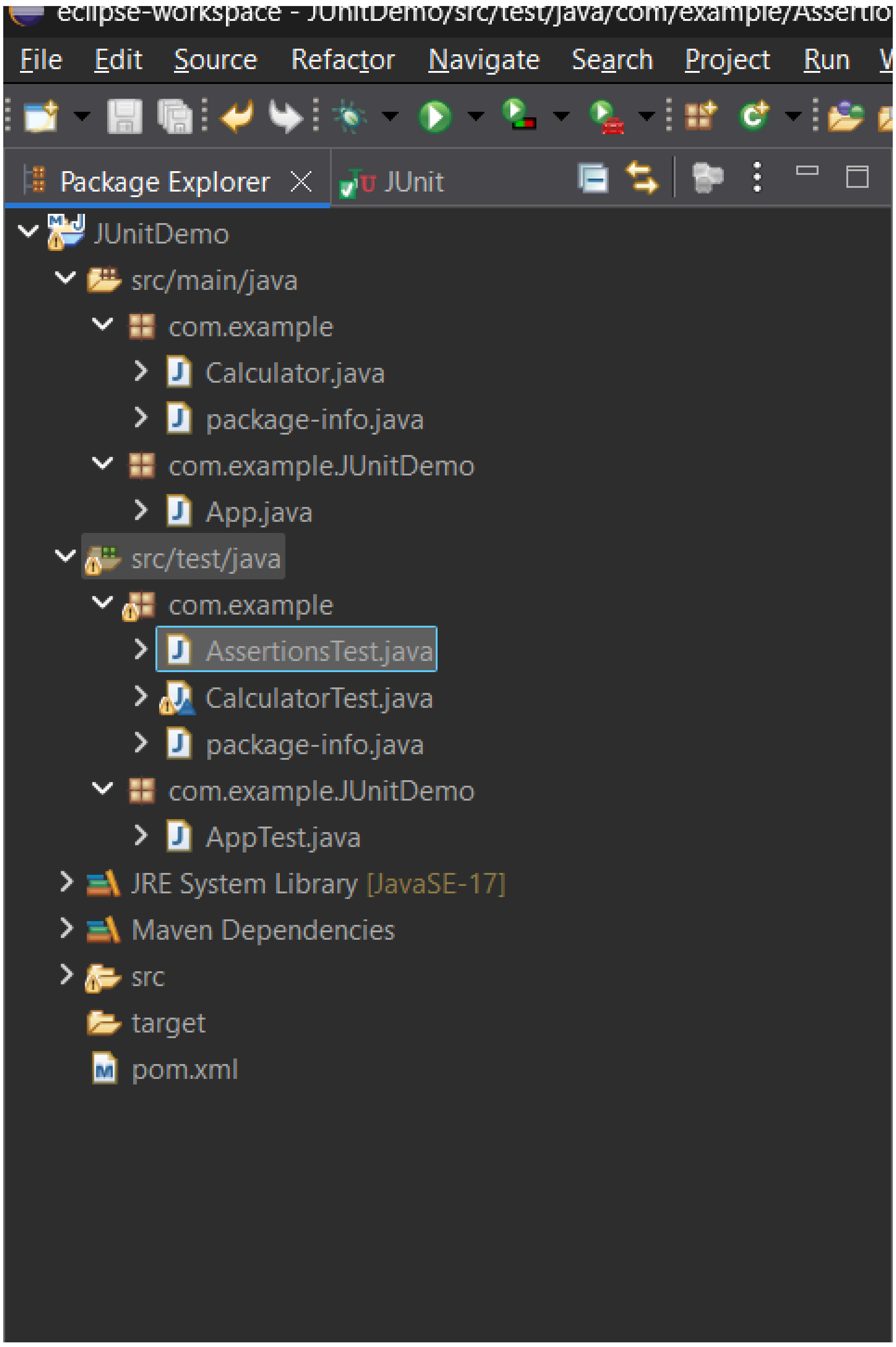
```java
package com.example;

import org.junit.jupiter.api.Test;

import com.example.Calculator;

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

class CalculatorTest {

    @Test
    void testAdd() {
        Calculator calc = new Calculator();
        int result = calc.add(4, 6);
        assertEquals(10, result);
    }
}
```

```
<terminated> CalculatorTest [JUnit] C:\Program Files\Java\jdk-17\bin\javaw.exe  (Jun 29, 2025, 3:21:54 PM – 3:21:59 PM elapsed: 0:00:05.392) [pid: 91200]
```

Exercise 3: Assertions in JUnit Scenario:

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

FOLDER STRUCTURE

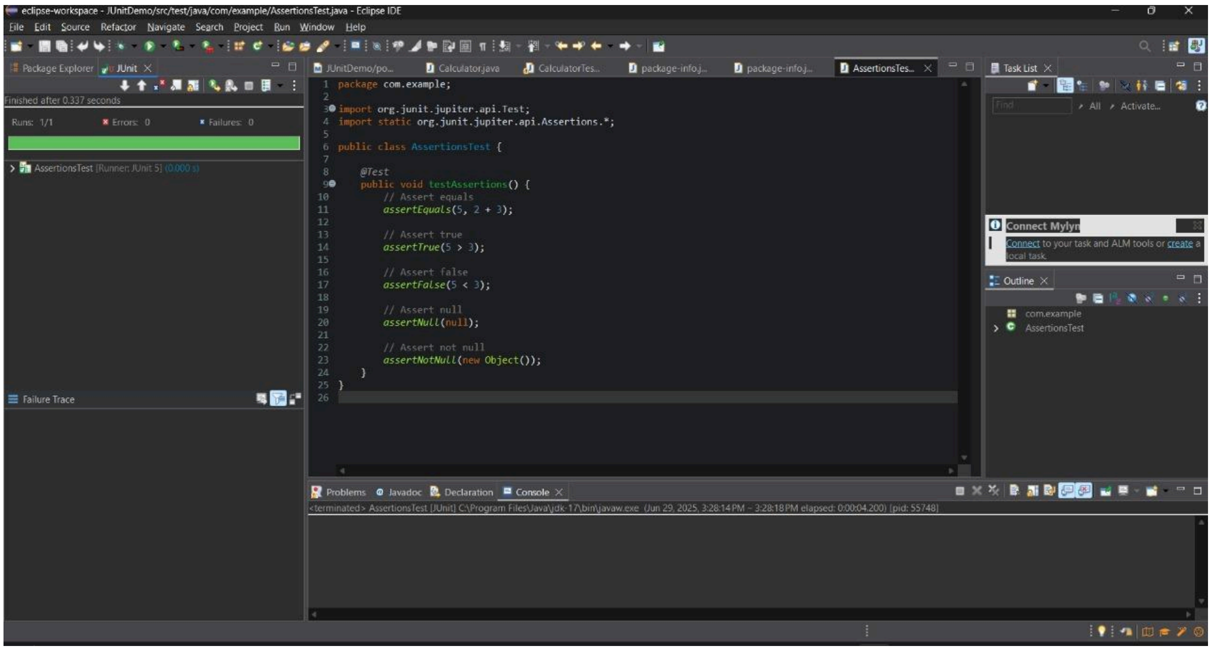


```
eclipse-workspace - JUnitDemo/src/test/java/com/example/Assertio
File  Edit  Source  Refactor  Navigate  Search  Project  Run  W
Package Explorer ×   JUnit
JUnitDemo
  src/main/java
    com.example
      Calculator.java
      package-info.java
    com.example.JUnitDemo
      App.java
  src/test/java
    com.example
      AssertionsTest.java
      CalculatorTest.java
      package-info.java
    com.example.JUnitDemo
      AppTest.java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  pom.xml
```

AssertionsTest.java

```
package com.example;

import org.junit.jupiter.api.Test;

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

public class AssertionsTest {

    @Test

    public void testAssertions() {

        assertEquals(5, 2 + 3);

        assertTrue(5 > 3);

        assertFalse(5 < 3);

        assertNull(null);

        assertNotNull(new Object());

    }

}
```

OUTPUT



eclipse-workspace - JUnitDemo/src/test/java/com/example/AssertionsTest.java - Eclipse IDE

```
Finished after 0.337 seconds
Runs: 1/1      Errors: 0      Failures: 0
> AssertionsTest [Runner: JUnit 5] (0.000 s)
```

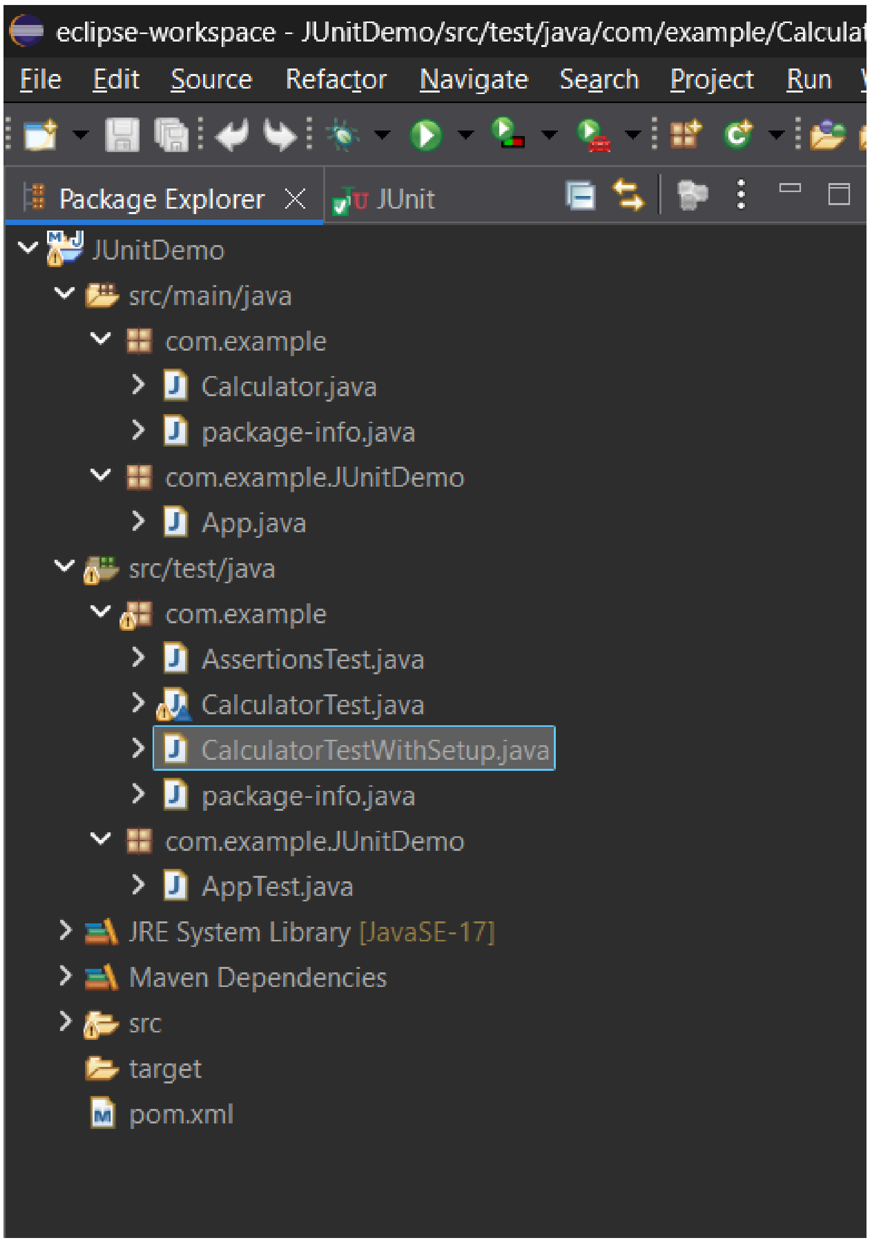
```
package com.example;

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

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());
    }
}
```

```
<terminated> AssertionsTest [JUnit] C:\Program Files\Java\jdk-17\bin\javaw.exe  (Jun 29, 2025, 3:28:14 PM – 3:28:18 PM elapsed: 0:00:04.200) [pid: 55748]
```

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

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

FOLDER STRUCTURE

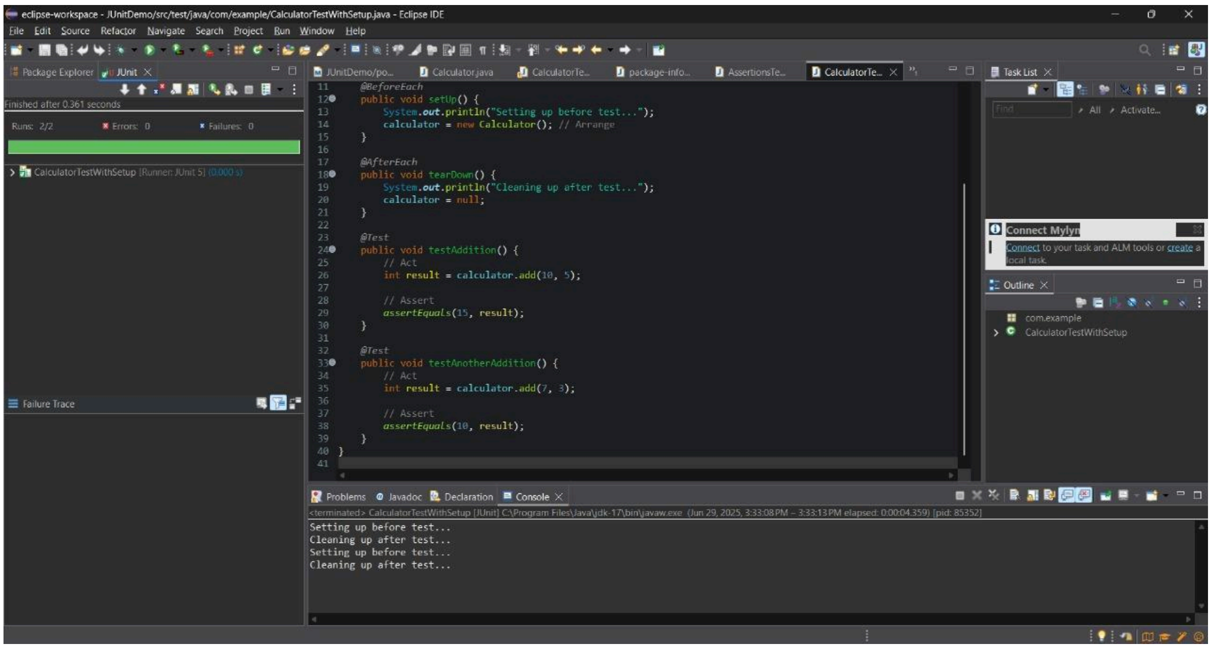

eclipse-workspace - JUnitDemo/src/test/java/com/example/Calculat
File Edit Source Refactor Navigate Search Project Run
Package Explorer
JUnit

```
JUnitDemo
  src/main/java
    com.example
      Calculator.java
      package-info.java
    com.example.JUnitDemo
      App.java
  src/test/java
    com.example
      AssertionsTest.java
      CalculatorTest.java
      CalculatorTestWithSetup.java
      package-info.java
    com.example.JUnitDemo
      AppTest.java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  pom.xml
```

<u>CalculatorTestWithSetup.java</u>

```
package com.example;

import org.junit.jupiter.api.*;

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

public class CalculatorTestWithSetup {

    private Calculator calculator;

   @BeforeEach

    public void setUp() {

        System.out.println("Setting up before test...");

        calculator = new Calculator(); // Arrange

    }

@AfterEach

    public void tearDown() {

        System.out.println("Cleaning up after test...");

        calculator = null;

    }

@Test

    public void testAddition() {

        // Act

        int result = calculator.add(10, 5);

       // Assert

        assertEquals(15, result);

    }

@Test

    public void testAnotherAddition() {

        // Act

        int result = calculator.add(7, 3);
// Assert
assertEquals(10, result);
    }
}
```

OUTPUT


eclipse-workspace - JUnitDemo/src/test/java/com/example/CalculatorTestWithSetup.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
JUnitDemo/po...
Calculator.java
CalculatorTe...
package-info...
AssertionsTe...
CalculatorTe...
Task List
Outline
com.example
CalculatorTestWithSetup
Connect Mylyn
Connect to your task and ALM tools or create a local task.
Failure Trace
Problems
Javadoc
Declaration
Console

Finished after 0.361 seconds

Runs: 2/2   Errors: 0   Failures: 0

CalculatorTestWithSetup [Runner: JUnit 5] (0.000 s)

```java
    @BeforeEach
    public void setUp() {
        System.out.println("Setting up before test...");
        calculator = new Calculator(); // Arrange
    }

    @AfterEach
    public void tearDown() {
        System.out.println("Cleaning up after test...");
        calculator = null;
    }

    @Test
    public void testAddition() {
        // Act
        int result = calculator.add(10, 5);

        // Assert
        assertEquals(15, result);
    }

    @Test
    public void testAnotherAddition() {
        // Act
        int result = calculator.add(7, 3);

        // Assert
        assertEquals(10, result);
    }
}
```

```
<terminated> CalculatorTestWithSetup [JUnit] C:\Program Files\Java\jdk-17\bin\javaw.exe (Jun 29, 2025, 3:33:08 PM – 3:33:13 PM elapsed: 0:00:04.359) [pid: 85352]
Setting up before test...
Cleaning up after test...
Setting up before test...
Cleaning up after test...
```