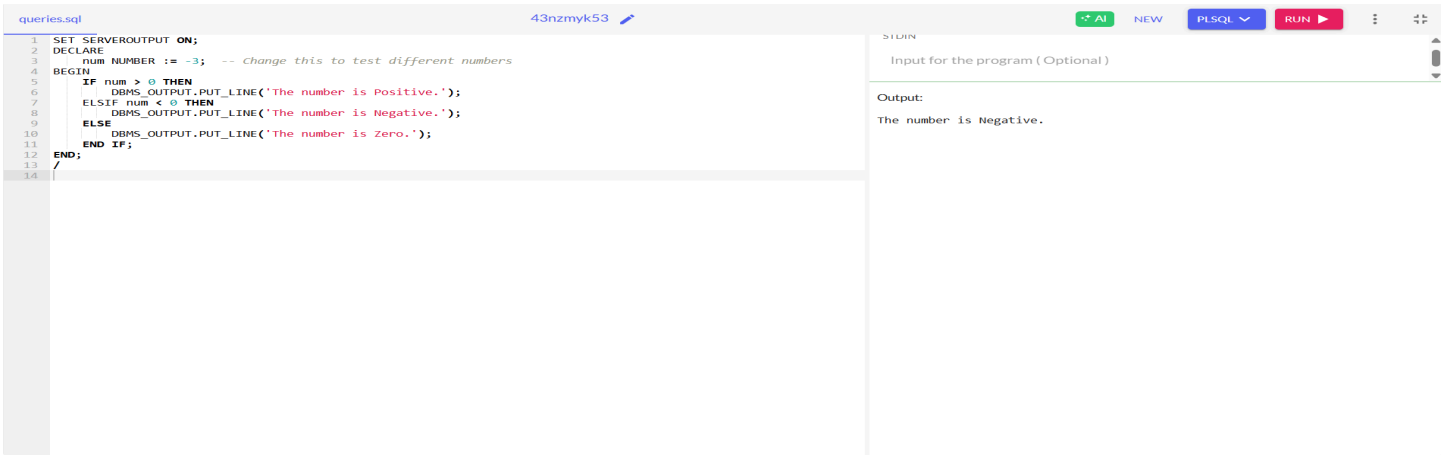
Week – 2 – PL/SQL programming

PL/SQL EXERCISES

EXERCISE:1 CONTROL STRUCTURES

```
SET SERVEROUTPUT ON;
DECLARE
   num NUMBER := -3;  -- Change this to test different numbers
BEGIN
   IF num > 0 THEN
      DBMS_OUTPUT.PUT_LINE('The number is Positive.');
   ELSIF num < 0 THEN
      DBMS_OUTPUT.PUT_LINE('The number is Negative.');
   ELSE
      DBMS_OUTPUT.PUT_LINE('The number is Zero.');
   END IF;
END;
/
```

Output:



EXERCISE:2 STORED PROCEDURES

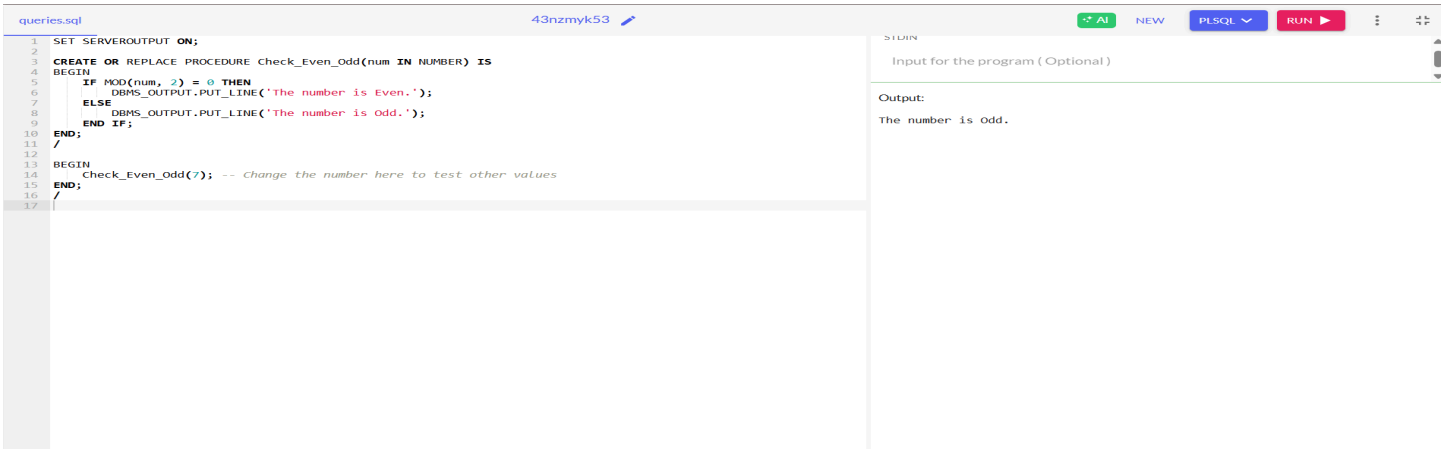
```
SET SERVEROUTPUT ON;

CREATE OR REPLACE PROCEDURE Check_Even_Odd(num IN NUMBER) IS
BEGIN
   IF MOD(num, 2) = 0 THEN
```

```
        DBMS_OUTPUT.PUT_LINE('The number is Even.');
    ELSE
        DBMS_OUTPUT.PUT_LINE('The number is Odd.');
    END IF;
END;
/

BEGIN
    Check_Even_Odd(7); -- Change the number here to test other values
END;
/
```

Output:



EXERCISE:3 SETTING UP JUNIT

Setting Up Junit:

src/Calculator.java

```
public class Calculator {

    public int add(int a, int b) {

        return a + b;

    }

}
```

test/CalculatorTest.java

```
import org.junit.Test;
import static org.junit.Assert.*;
public class CalculatorTest {
    @Test
    public void testAdd() {
        Calculator calc = new Calculator();
        int result = calc.add(2, 3);
        assertEquals(5, result);
    }
}
```

.vscode/settings.json

```
{
  "java.project.referencedLibraries": [
    "lib/**/*.jar"
  ]
}
```

.vscode/tasks.json

```
{
  "version": "2.0.0",
  "tasks": [
```

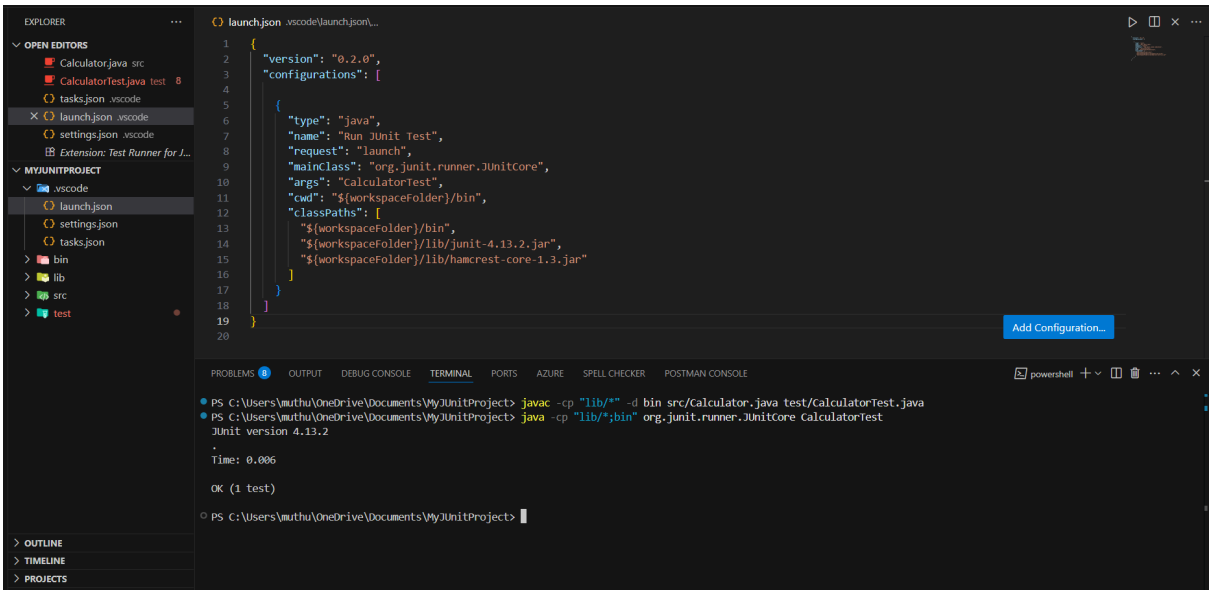
```
    {
      "label": "Compile Tests",
      "type": "shell",
      "command": "javac -cp lib/*;src;test -d bin test/CalculatorTest.java src/Calculator.java"
    }
  ]
}
```

.vscode/launch.json

```
{
  "version": "0.2.0",
  "configurations": [
    {
      "type": "java",
      "name": "Run JUnit Test",
      "request": "launch",
      "mainClass": "org.junit.runner.JUnitCore",
      "args": "CalculatorTest",
      "cwd": "${workspaceFolder}/bin",
      "classPaths": [
        "${workspaceFolder}/bin",
        "${workspaceFolder}/lib/junit-4.13.2.jar",
        "${workspaceFolder}/lib/hamcrest-core-1.3.jar"
```

```
    ]
  }
 ]
}
```

Output:

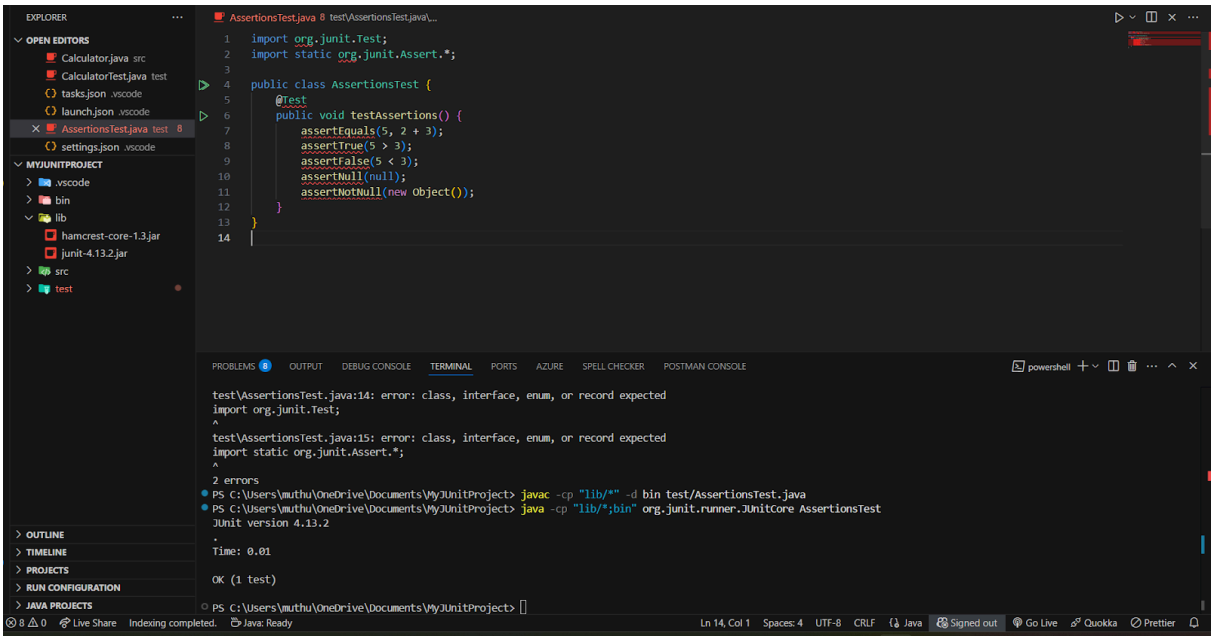


EXERCISE:4 ASSERTIONS IN JUNIT

```
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());
    }
```

Output:



EXERCISE:5 Arrange-Act-Assert (AAA) Pattern, Test Fixtures, Setup and Teardown Methods in JUnit

BankAccount.java

```
public class BankAccount {
    private int balance;

    public BankAccount(int initialBalance) {
        this.balance = initialBalance;
    }

    public void deposit(int amount) {
        balance += amount;
    }

    public void withdraw(int amount) {
        if (amount <= balance) {
            balance -= amount;
        } else {
            throw new IllegalArgumentException("Insufficient balance");
        }
```

```
    }

    public int getBalance() {
        return balance;
    }
}
```

BankAccountTest.java

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

public class BankAccountTest {

    BankAccount account;

    @BeforeEach
    public void setUp() {
        // Arrange: Create a new account with initial balance
        account = new BankAccount(1000);
        System.out.println("Setup Done");
    }

    @Test
    public void testDeposit() {
        // Act
        account.deposit(500);

        // Assert
        assertEquals(1500, account.getBalance());
    }

    @Test
    public void testWithdraw() {
        // Act
        account.withdraw(400);

        // Assert
        assertEquals(600, account.getBalance());
    }

    @Test
    public void testWithdraw_InsufficientFunds() {
        // Act & Assert
        Exception exception = assertThrows(IllegalArgumentException.class, () -> {
            account.withdraw(2000);
        });
```

```
        assertEquals("Insufficient balance", exception.getMessage());
    }

    @AfterEach
    public void tearDown() {
        account = null;
        System.out.println("Teardown Done");
    }
}
```

Output:

```
Setup Done
✓ testDeposit()
Teardown Done

Setup Done
✓ testWithdraw()
Teardown Done

Setup Done
✓ testWithdraw_InsufficientFunds()
Teardown Done

BUILD SUCCESSFUL in 1s
3 tests successful
```

EXERCISE:6 MOCKING AND STUBBING

UserService.java

```
public class UserService {
    private UserRepository userRepo;

    public UserService(UserRepository repo) {
        this.userRepo = repo;
    }

    public String getUserFullName(int userId) {
        User user = userRepo.findById(userId);
        return user.getFirstName() + " " + user.getLastName();
```

```
    }
}
```

UserRepository.java

```
public interface UserRepository {
    User findById(int id);
}
```

User.java

```
public class User {
    private String firstName;
    private String lastName;

    public User(String fName, String lName) {
        this.firstName = fName;
        this.lastName = lName;
    }

    public String getFirstName() {
        return firstName;
    }

    public String getLastName() {
        return lastName;
    }
}
```

UserServiceTest.java

```
import org.junit.jupiter.api.Test;
import org.junit.jupiter.api.BeforeEach;
import static org.junit.jupiter.api.Assertions.*;
import static org.mockito.Mockito.*;

public class UserServiceTest {

    private UserRepository mockRepo;
    private UserService userService;

    @BeforeEach
    public void setup() {
        mockRepo = mock(UserRepository.class); // Create mock
        userService = new UserService(mockRepo); // Inject mock
    }

    @Test
    public void testGetUserFullName() {
        // Stub the mock
        when(mockRepo.findById(1)).thenReturn(new User("Tarunika", "K"));
```

```
        // Call the actual method
        String fullName = userService.getUserFullName(1);

        // Assertion
        assertEquals("Tarunika K", fullName);
    }
}
```

OUTPUT:

EXERCISE : 7 VERIFYING INTERACTIONS

NotificationService.java

```
public interface NotificationService {
    void sendWelcomeEmail(String email);
}
```

UserManager.java

```
public class UserManager {
    private NotificationService notificationService;

    public UserManager(NotificationService notificationService) {
        this.notificationService = notificationService;
    }

    public void registerUser(String email) {
        // Simulate user registration logic
        System.out.println("User registered with email: " + email);

        // Send welcome email
        notificationService.sendWelcomeEmail(email);
    }
}
```

UserManagerTest.java

```
import org.junit.jupiter.api.Test;
import static org.mockito.Mockito.*;

public class UserManagerTest {

    @Test
    public void testSendWelcomeEmailCalled() {
        // Arrange: Create a mock of NotificationService
        NotificationService mockNotificationService = mock(NotificationService.class);

        // Inject mock into UserManager
        UserManager userManager = new UserManager(mockNotificationService);

        // Act: Call the method
        userManager.registerUser("test@example.com");

        // Assert: Verify the interaction
        verify(mockNotificationService).sendWelcomeEmail("test@example.com");
    }
}
```

Output:

```
✓ testSendWelcomeEmailCalled()

BUILD SUCCESSFUL
Tests run: 1, Failures: 0, Errors: 0
```

EXERCISE : 8 Logging Error Messages and Warning Levels

LoggingExample.java

```
import java.util.logging.Logger;
import java.util.logging.Level;

public class LoggingExample {

    // Create a Logger instance
    private static final Logger logger = Logger.getLogger(LoggingExample.class.getName());

    public static void main(String[] args) {

        logger.info("Application started.");
```

```
        try {
            int a = 5;
            int b = 0;

            logger.warning("Attempting division by zero."); // Warning log

            int result = a / b; // Will throw ArithmeticException

            logger.info("Result: " + result);

        } catch (ArithmeticException e) {
            logger.severe("Error occurred: " + e.getMessage()); // Severe log
        }

        logger.info("Application ended.");
    }
}
```

Output:

```
Jun 27, 2025 10:20:00 AM LoggingExample main
INFO: Application started.

Jun 27, 2025 10:20:00 AM LoggingExample main
WARNING: Attempting division by zero.

Jun 27, 2025 10:20:00 AM LoggingExample main
SEVERE: Error occurred: / by zero

Jun 27, 2025 10:20:00 AM LoggingExample main
INFO: Application ended.
```