Unit testing & Clean Code

1. Write all possible (including failure, exception case) Unit Tests for all the methods in First.java.

CODE

```
package com.im;

import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Nested;
import org.junit.jupiter.api.Test;
import org.junit.jupiter.api.function.Executable;

import java.math.BigDecimal;
import java.util.ArrayList;
import java.util.List;

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

public class FirstTest {
  @Test
  void canary(){
     assertTrue(true);
  }

  @Nested
  class replaceSubStringTest {
     First obj;

     @BeforeEach
     void initialize() {
        obj = new First();
     }

     @Test
     void should_returnTrue_When_replaceSubString_isCorrect() {

        //given
        String mainString = "Hello World";
        String subString = "World";
        String replacementString = "India";

        //when
```

```
    String temp = obj.replaceSubString(mainString, subString, replacementString);

    //then
    assertEquals("Hello India", temp);
}

@Test
void should_returnTrue_When_mainString_isEmpty() {
    //given
    String mainString = "";
    String subString = "World";
    String replacementString = "India";

    //when
    String temp = obj.replaceSubString(mainString, subString, replacementString);

    //then
    assertEquals("", temp);

}

@Test
void should_returnTrue_When_subString_isNull(){ //subString != null
    //given
    String mainString = "Hello World";
    String subString=null;
    String replacementString="India";

    //when
    String temp = obj.replaceSubString(mainString,subString,replacementString);
    //then
    assertEquals("Hello World", temp);
}

@Test
void should_returnTrue_When_replacementString_isNull(){
    //given
    String mainString="Hello World";
    String subString="World";
    String replacementString=null;

    //when
    String temp = obj.replaceSubString(mainString,subString,replacementString);
```

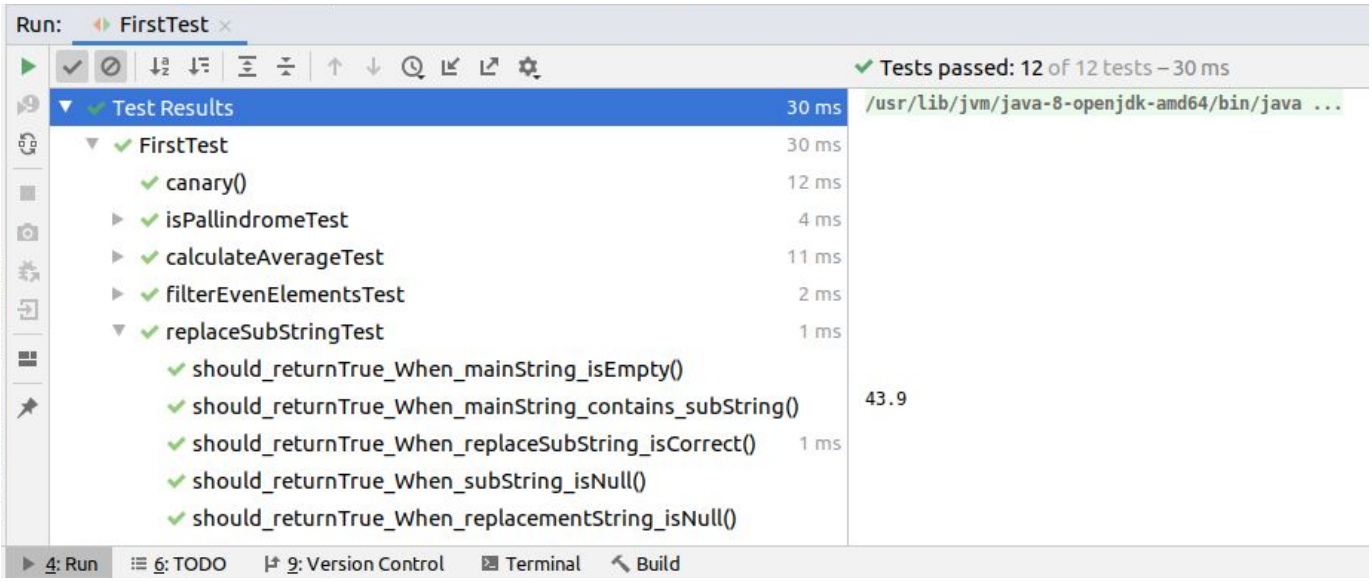
```
        //then
        assertEquals("Hello World", temp);
    }

    @Test
    void should_returnTrue_When_mainString_contains_subString(){
        //given
        String mainString="Hello World";
        String subString="Usa";
        String replacementString="India";

        //when
        String temp = obj.replaceSubString(mainString,subString,replacementString);
        //then
        assertEquals("Hello World", temp);
    }

}

@Nested
class filterEvenElementsTest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_returnTrue_List_isCorrect(){
        //given
        List<Integer> ls = new ArrayList<>();
        ls.add(5);
        ls.add(2);
        ls.add(9);
        List<Integer> expected = new ArrayList<>();
        expected.add(5);
        expected.add(9);

        //when
        List<Integer> output = obj.filterEvenElements(ls);

        //then
```

```
        assertArrayEquals(expected.toArray(),output.toArray());
    }
}

@Nested
class calculateAverageTest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_returnTrue_When_calculateAverage(){
        //given
        List<BigDecimal> values = new ArrayList<>();
        values.add(new BigDecimal("10.3"));
        values.add(new BigDecimal("99.3"));
        values.add(new BigDecimal("22.1"));

        //when
        BigDecimal avg = obj.calculateAverage(values);

        System.out.println(avg);

        //then
        assertEquals(new BigDecimal("43.9"),avg);
    }

    @Test
    void should_returnTrue_When_Value_isNULL(){
        //given
        List<BigDecimal> values = new ArrayList<>();

        //when
        Executable exe = () -> obj.calculateAverage(values);

        //then
        assertThrows(RuntimeException.class,exe);
    }

    @Test
```

```
    void should_returnTrue_When_ValueSize_Is_LessThan_1(){
        //given
        List<BigDecimal> values = new ArrayList<>();

        //when
        Executable exe = () -> obj.calculateAverage(values);

        //then
        assertThrows(RuntimeException.class,exe);
    }
}

@Nested
class isPallindromeTest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_returnTrue_Palindrome_isCorrect() {
        //given
        String origString = "abcba";
        String reverseString = "abcba";

        //when
        Boolean expected = obj.isPallindrome(origString);

        //then
        assertTrue(expected);
    }

    @Test
    void should_returnFalse_Palindrome_isNotCorrect() {
        //given
        String origString = "Aayushi";
        String reverseString = "ihsuyaA";

        //when
        Boolean expected = obj.isPallindrome(origString);
```

```
        //then
        assertFalse(expected);
    }
  }
}
```

OUTPUT



2. Write Unit tests for HealthyCoder app given in the Udemy session. You need to write tests for the BMICalculator and DitePlanner.

CODE-*BMICalculator*

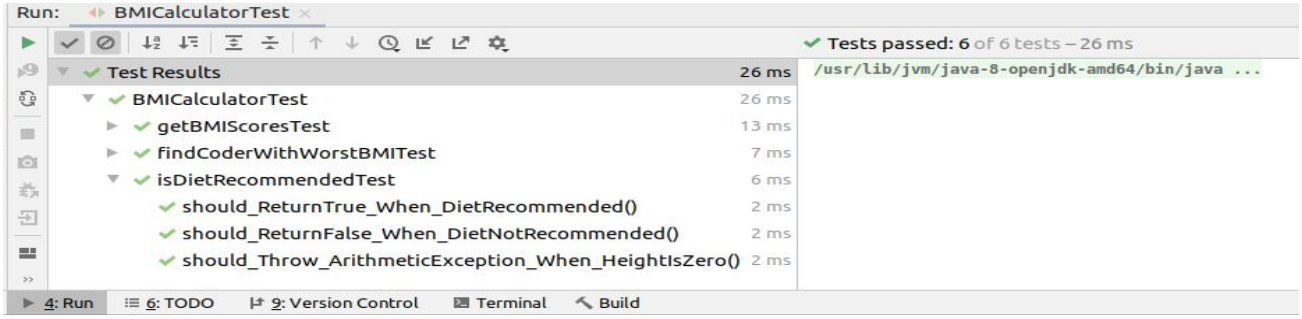
```
package healthycoderapp;

import com.im.First;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Nested;
import org.junit.jupiter.api.Test;
import org.junit.jupiter.api.function.Executable;

import java.util.ArrayList;
import java.util.List;

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

class BMICalculatorTest {
```

```
@Nested
class isDietRecommendedTest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_ReturnTrue_When_DietRecommended() {
        //given
        double weight = 80;
        double height = 1.5;
        //when

        boolean recommended = BMICalculator.isDietRecommended(weight, height);
        //then

        assertTrue(recommended);
    }

    @Test
    void should_ReturnFalse_When_DietNotRecommended() {
        //given
        double weight = 40;
        double height = 1.95;
        //when

        boolean recommended = BMICalculator.isDietRecommended(weight, height);
        //then

        assertFalse(recommended);
    }

    @Test
    void should_Throw_ArithmeticException_When_HeightIsZero() {
        //given
        double weight = 40;
        double height = 0.0;

        //when
        Executable exe = () -> BMICalculator.isDietRecommended(weight, height);
```

```
        //then
        assertThrows(ArithmeticException.class,exe);
    }
}

@Nested
class findCoderWithWorstBMITest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_ReturnCoderWithWorstBMI_When_CoderListNotEmpty()
    {
        //given
        List<Coder> coders = new ArrayList<>();
        coders.add(new Coder(1.80,60.0));
        coders.add(new Coder(1.82,65.2));
        coders.add(new Coder(1.82,98.0));

        //when
        Coder coderWorstBMI = BMICalculator.findCoderWithWorstBMI(coders);

        //then
        assertAll(
                () -> assertEquals(1.82,coderWorstBMI.getHeight()),
                () -> assertEquals(98.0,coderWorstBMI.getWeight())
        );
    }

    @Test
    void should_ReturnNullWorstBMICoder_When_CoderListEmpty()
    {
        //given
        List<Coder> coders = new ArrayList<>();

        //when
        Coder coderWorstBMI = BMICalculator.findCoderWithWorstBMI(coders);
```

```
        //then
        assertNull(coderWorstBMI);
    }
  }

  @Nested
  class getBMIScoresTest {
    First obj;

    @BeforeEach
    void initialize() {
        obj = new First();
    }

    @Test
    void should_returnCorrectBMIScoreArray_When_CoderListNotEmpty()
    {
        //given
        List<Coder> coders = new ArrayList<>();
        coders.add(new Coder(1.80,60.0));
        coders.add(new Coder(1.82,98.0));
        coders.add(new Coder(1.82,64.7));
        double[] expected = {18.52,29.59,19.53};

        //when
        double[] bmiscores = BMICalculator.getBMIScores(coders);

        //then
        assertArrayEquals(expected,bmiscores);
    }
  }
}
```

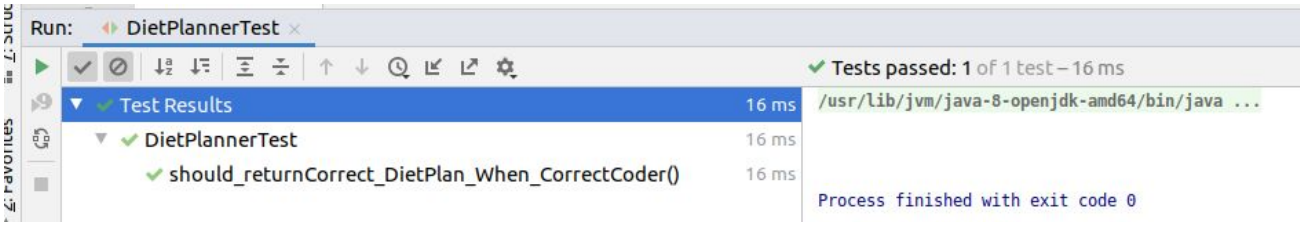
OUTPUT



CODE-*DitePlanner*

```
package healthycoderapp;

import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

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

class DietPlannerTest {

  private DietPlanner dietPlanner;

  @BeforeEach
  void setup(){
     this.dietPlanner = new DietPlanner(20,30,50);
  }

  @Test
  void should_returnCorrect_DietPlan_When_CorrectCoder(){
     //given
     Coder coder = new Coder(1.82,75.0,26,Gender.MALE);
     DietPlan expected = new DietPlan(2202,110,73,275);


     //when
     DietPlan actual = dietPlanner.calculateDiet(coder);

     //then
     assertAll(
           () -> assertEquals(expected.getCalories(),actual.getCalories()),
           () -> assertEquals(expected.getProtein(),actual.getProtein()),
           () -> assertEquals(expected.getCarbohydrate(),actual.getCarbohydrate()),
           () -> assertEquals(expected.getFat(),actual.getFat())
     );
  }
}
```

OUTPUT


Run:
DietPlannerTest
Tests passed: 1 of 1 test – 16 ms
Test Results
16 ms
/usr/lib/jvm/java-8-openjdk-amd64/bin/java ...
DietPlannerTest
16 ms
should_returnCorrect_DietPlan_When_CorrectCoder()
16 ms
Process finished with exit code 0