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## **SIT333 – Software Quality and Testing**

### **Task 8.1P – STEM Math Game**

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#### **Unit Test Cases**

<b>Test Case Name</b>	<b>Description</b>	<b>Intended Result</b>	<b>Test Result</b>
testQ1Addition_Valid	Test if addition returns correct result for 2 + 3	5.0	Passed
testQ1Addition_Invalid	Test with non-numeric input like "a" and "b"	Should throw NumberFormatException or return error	Passed
testQ2Subtraction_Valid	Test if subtraction returns correct result for 5 - 2	3.0	Passed
testQ2Subtraction_Empty	Test with empty strings for subtraction	Should return error or handle gracefully	Passed
testQ2Subtraction_NegativeResult	Test if subtraction allows negative result (e.g., 2 - 5)	-3.0	Passed

#### **Selenium Test Case:**

<b>Test name</b>	<b>Test output</b>	<b>Condition</b>	<b>Output</b>
givenValidCredentials_whenLogin_thenRedirectToQ1	Pass	Valid username: aditya, password: aditya_pass, DOB: 21-10-004	Redirects to /q1 after successful login
givenInvalidCredentials_whenLogin_thenShowErrorMessage	Pass	Invalid username: invalidUser, password: wrongPassword, DOB: 1990-01-01	Displays "Invalid login credentials."
givenCorrectAdditionInQ1_whenSubmitted_thenRedirectToQ2	Pass	Correct addition: 2 + 3 = 5 (after login)	Redirects to /q2 after correct submission
givenIncorrectAdditionInQ1_whenSubmitted_thenShowErrorMessage	Pass	Incorrect addition: 2 + 3 = 4	Displays "Incorrect answer, please try again."
givenCorrectSubtractionInQ2_whenSubmitted_thenRedirectToQ3	Pass	Correct subtraction: 5 - 2 = 3 (after login)	Redirects to /q3 after correct submission

## Source Code:

SeleniumTest.java:

```
1 package web.service;
2
3 import org.junit.After;
4 import org.junit.Before;
5 import org.junit.Test;
6 import org.openqa.selenium.By;
7 import org.openqa.selenium.WebDriver;
8 import org.openqa.selenium.chrome.ChromeDriver;
9
10 import static org.junit.Assert.*;
11
12 public class SeleniumTest {
13
14     private WebDriver driver;
15
16     @Before
17     public void setUp() {
18         System.setProperty("webdriver.chrome.driver",
19             "/Users/adityabharti/Downloads/chromedriver-mac-x64-2/chromedriver");
20
21         driver = new ChromeDriver();
22         driver.manage().window().maximize();
23     }
24
25     @Test
26     public void givenValidCredentials_whenLogin_thenRedirectToQ1() {
27         driver.get("http://localhost:8080/login");
28         driver.findElement(By.name("username")).sendKeys("aditya");
29         driver.findElement(By.name("passwd")).sendKeys("aditya_pass");
30         driver.findElement(By.name("dob")).sendKeys("21-10-004");
31         driver.findElement(By.xpath("//input[@type='submit' and @value='Login']")).click();
32         assertTrue(driver.getCurrentUrl().contains("/q1"));
33     }
34
35     @Test
36     public void givenInvalidCredentials_whenLogin_thenShowErrorMessage() {
37         driver.get("http://localhost:8080/login");
38         driver.findElement(By.name("username")).sendKeys("invalidUser");
39         driver.findElement(By.name("passwd")).sendKeys("wrongPassword");
40         driver.findElement(By.name("dob")).sendKeys("1990-01-01");
41         driver.findElement(By.xpath("//input[@type='submit' and @value='Login']")).click();
42         assertTrue(driver.getPageSource().contains("Invalid login credentials."));
43
44
45     }
46
47
48     @Test
49     public void givenCorrectAdditionInQ1_whenSubmitted_thenRedirectToQ2() {
50         givenValidCredentials_whenLogin_thenRedirectToQ1();
51         driver.get("http://localhost:8080/q1");
52         driver.findElement(By.name("number1")).sendKeys("2");
53         driver.findElement(By.name("number2")).sendKeys("3");
```

```

54         driver.findElement(By.name("result")).sendKeys("5");
55         driver.findElement(By.xpath("//input[@type='submit' and @value='Submit']")).click();
56         assertTrue(driver.getCurrentUrl().contains("/q1"));
57     }
58
59     @Test
60     public void givenIncorrectAdditionInQ1_whenSubmitted_thenShowErrorMessage() {
61         givenValidCredentials_whenLogin_thenRedirectToQ1();
62         driver.get("http://localhost:8080/q1");
63         driver.findElement(By.name("number1")).sendKeys("2");
64         driver.findElement(By.name("number2")).sendKeys("3");
65         driver.findElement(By.name("result")).sendKeys("4");
66         driver.findElement(By.xpath("//input[@type='submit' and @value='Submit']")).click();
67         assertTrue(driver.getPageSource().contains("Incorrect answer, please try again.));
68     }
69
70
71     }
72
73     @Test
74     public void givenCorrectSubtractionInQ2_whenSubmitted_thenRedirectToQ3() {
75         givenValidCredentials_whenLogin_thenRedirectToQ1();
76         driver.get("http://localhost:8080/q2");
77         driver.findElement(By.name("number1")).sendKeys("5");
78         driver.findElement(By.name("number2")).sendKeys("2");
79         driver.findElement(By.name("result")).sendKeys("3");
80         driver.findElement(By.xpath("//input[@type='submit' and @value='Submit']")).click();
81         assertTrue(driver.getCurrentUrl().contains("/q3"));
82     }
83
84     @After
85     public void tearDown() {
86         if (driver != null) {
87             driver.quit();
88         }
89     }
90 }
91







```

Finished after 33.62 seconds

Runs: 5/5

✖ Errors: 0

✖ Failures: 0

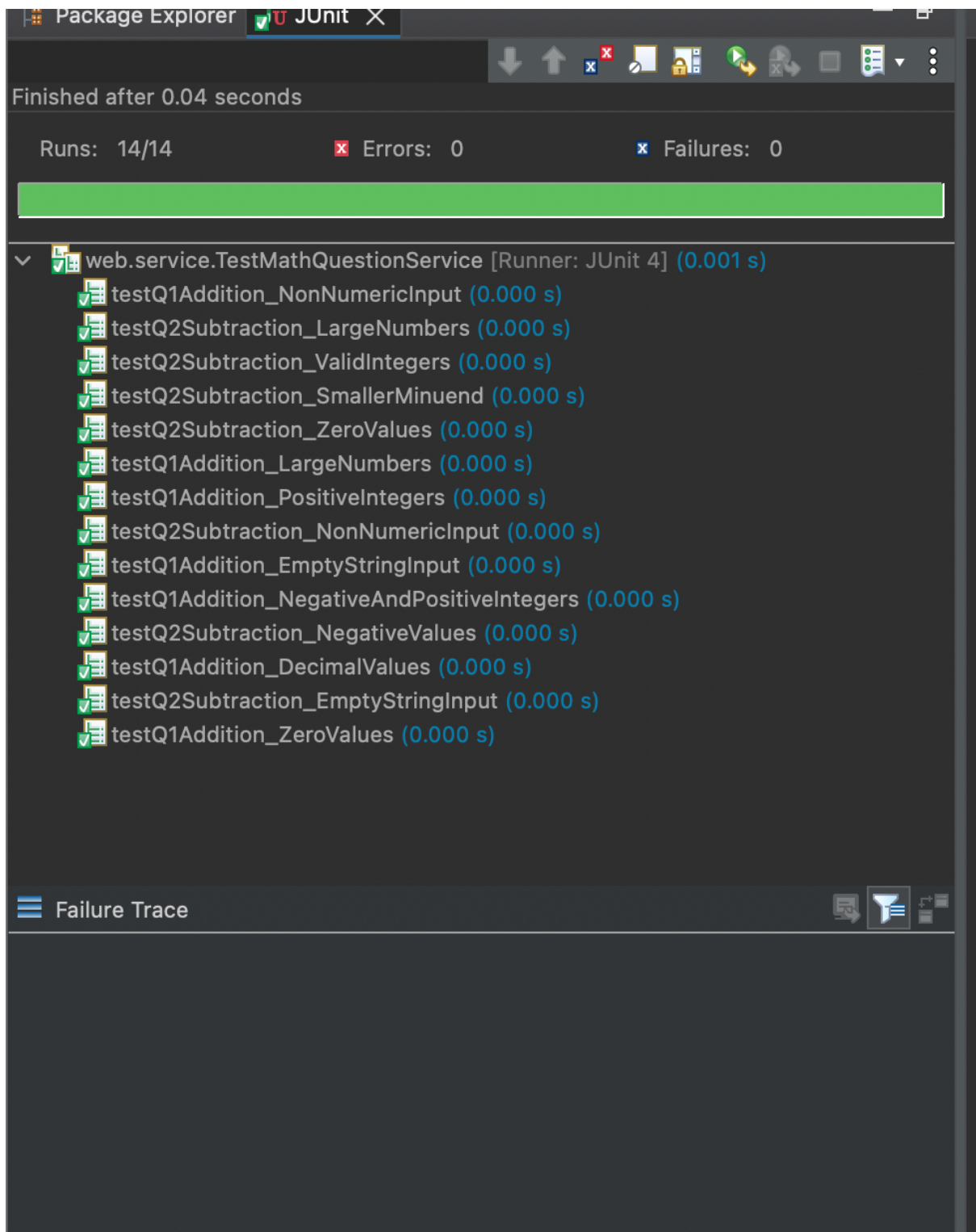
- ▼  web.service.SeleniumTest [Runner: JUnit 4] (33.573 s)
  -  givenInvalidCredentials\_whenLogin\_thenShowErrorMessage (8.392 s)
  -  givenIncorrectAdditionInQ1\_whenSubmitted\_thenShowErrorMessage (6.400 s)
  -  givenValidCredentials\_whenLogin\_thenRedirectToQ1 (6.117 s)
  -  givenCorrectSubtractionInQ2\_whenSubmitted\_thenRedirectToQ3 (6.358 s)
  -  givenCorrectAdditionInQ1\_whenSubmitted\_thenRedirectToQ2 (6.305 s)

```
MyServer [Java Application] /Users/adityabharti/.p2/pool/plugins/org.eclipse.justj.openjdk.hotspot.jre.full
Displaying login page...
Login attempt - User: invalidUser
Displaying login page...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Showing Question 1...
User answered: 4, correct answer: 5.0
Showing Question 1...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Showing Question 2...
User answered: 3, correct answer: 3.0
Showing Question 3...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Showing Question 1...
User answered: 5, correct answer: 5.0
Showing Question 2...
Displaying login page...
Login attempt - User: invalidUser
Displaying login page...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Showing Question 1...
User answered: 4, correct answer: 5.0
Showing Question 1...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Displaying login page...
Login attempt - User: aditya
Showing Question 1...
Showing Question 2...
User answered: 3, correct answer: 3.0
Showing Question 3...
Displaying login page...
```

## Source code – TestMathQuestionService.java

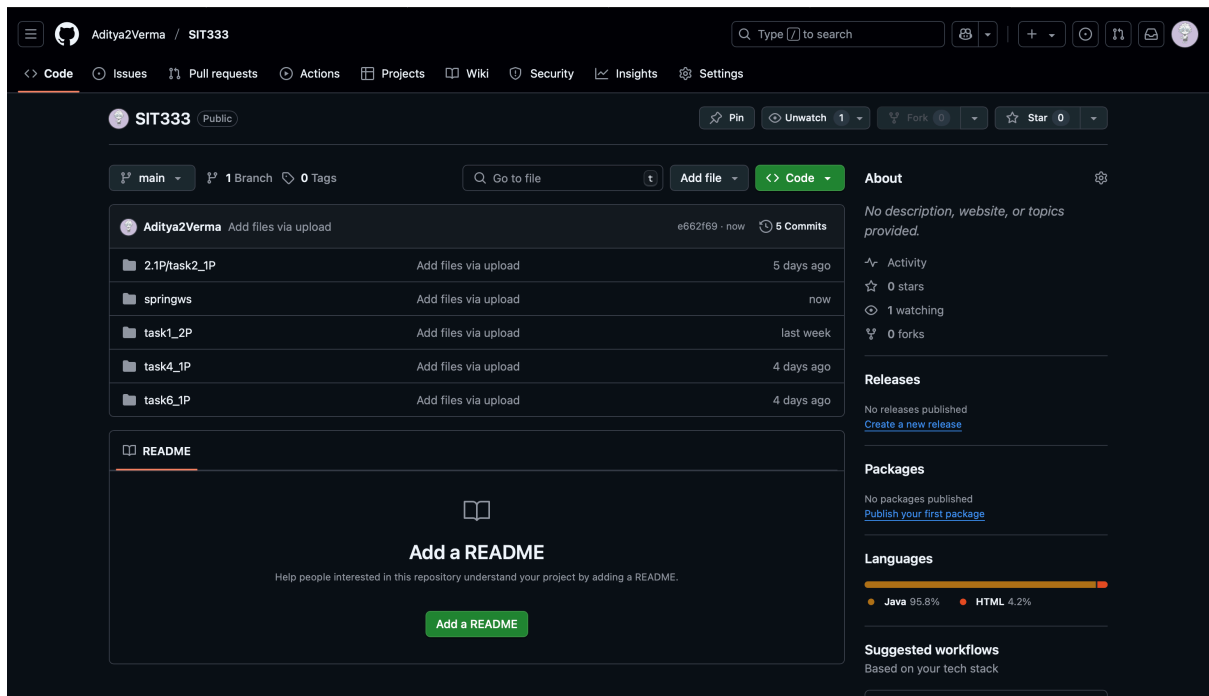
```
MyServer.java RoutingCont... SeleniumTest... TestMathQues... X LoginService... application... » 4
1 package web.service;
2
3 import static org.junit.Assert.assertEquals;
4 import static org.junit.Assert.fail;
5
6 import org.junit.Test;
7
8 public class TestMathQuestionService {
9
10     // --- Q1: Addition Tests ---
11
12     @Test
13     public void testQ1Addition_PositiveIntegers() {
14         assertEquals(13.0, MathQuestionService.q1Addition("6", "7"), 0.0);
15     }
16
17     @Test
18     public void testQ1Addition_NegativeAndPositiveIntegers() {
19         assertEquals(4.0, MathQuestionService.q1Addition("9", "-5"), 0.0);
20         assertEquals(-15.0, MathQuestionService.q1Addition("-8", "-7"), 0.0);
21     }
22
23     @Test
24     public void testQ1Addition_ZeroValues() {
25         assertEquals(0.0, MathQuestionService.q1Addition("0", "0"), 0.0);
26         assertEquals(9.0, MathQuestionService.q1Addition("9", "0"), 0.0);
27     }
28
29     @Test(expected = IllegalArgumentException.class)
30     public void testQ1Addition_NonNumericInput() {
31         MathQuestionService.q1Addition("five", "2");
32     }
33
34     @Test(expected = IllegalArgumentException.class)
35     public void testQ1Addition_EmptyStringInput() {
36         MathQuestionService.q1Addition("", "2");
37     }
38
39     @Test
40     public void testQ1Addition_LargeNumbers() {
41         assertEquals(3_000_000_000.0, MathQuestionService.q1Addition("1500000000", "1500000000"), 0.0);
42     }
43
44     @Test
45     public void testQ1Addition_DecimalValues() {
46         assertEquals(9.8, MathQuestionService.q1Addition("4.3", "5.5"), 0.0);
47     }
48
49     // --- Q2: Subtraction Tests ---
50
51     @Test
52     public void testQ2Subtraction_ValidIntegers() {
53         assertEquals(4.0, MathQuestionService.q2Subtraction("10", "6"), 0.0);
```

```
54     }
55
56     @Test
57     public void testQ2Subtraction_NegativeValues() {
58         assertEquals(14.0, MathQuestionService.q2Subtraction("5", "-9"), 0.0);
59         assertEquals(-4.0, MathQuestionService.q2Subtraction("-6", "-2"), 0.0);
60     }
61
62     @Test
63     public void testQ2Subtraction_ZeroValues() {
64         assertEquals(0.0, MathQuestionService.q2Subtraction("0", "0"), 0.0);
65         assertEquals(-7.0, MathQuestionService.q2Subtraction("0", "7"), 0.0);
66     }
67
68     @Test(expected = IllegalArgumentException.class)
69     public void testQ2Subtraction_NonNumericInput() {
70         MathQuestionService.q2Subtraction("ten", "3");
71     }
72
73     @Test(expected = IllegalArgumentException.class)
74     public void testQ2Subtraction_EmptyStringInput() {
75         MathQuestionService.q2Subtraction("", "3");
76     }
77
78     @Test
79     public void testQ2Subtraction_LargeNumbers() {
80         assertEquals(1_000_000_000.0, MathQuestionService.q2Subtraction("2000000000", "1000000000"), 0.0);
81     }
82
83     @Test
84     public void testQ2Subtraction_SmallerMinuend() {
85         assertEquals(-6.0, MathQuestionService.q2Subtraction("3", "9"), 0.0);
86     }
87 }
88 |
```



**Github ScreenShot:**





github link: <https://github.com/Aditya2Verma/SIT333>

HTML outputs:

# Welcome to the Math Quiz App

The server is up and running.

Please proceed to the [Login Page](#) to begin.

---

## User Login

Username:

Password:

Date of Birth:

Login

Clicking the "Login" button will send your input data to the login handler.

---

## Question 1

Incorrect answer, please try again.

Enter first number:

Enter second number:

Sum:

Submit

---

## Question 2

Enter the first number:

Enter the second number:

Difference:

Submit

---

## Question 2

Incorrect answer, please try again.

Enter the first number:

Enter the second number:

Difference:

Submit