SOEN 6011 : SOFTWARE ENGINEERING PROCESSES

SUMMER 2021

SUPER CALCULATOR

PROBLEM - 6

Unit Test Cases

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https://www.overleaf.com/project/610304de4e6b8d24f7c781b6

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Unit Test Case for F2 Function

The unit test cases for $tan(x)$ function is done using **JUnit 4** which are traceable to the requirements in problem-2.

Test Case : F2_UnitTestCase_1

Test Case ID	F2_tanZeroCheck_1
Requirement ID	F2-R1
Action	The user clicks the button "Tan" and gives an input 0 (degree) and then click result(=) button.
Input(s)	$tan(0)$
Expected Output	0
Actual Output	0
Test Result	Success

Test Case : F2_UnitTestCase_2

Test Case ID	F2_tanFortyCheck_2
Requirement ID	F2-R2
Action	The user clicks the button "Tan" and gives an input 40 (degree) and then click result(=) button.
Input(s)	$tan(40)$
Expected Output	0.83910101
Actual Output	0.83910101
Test Result	Success

Test Case : F2_UnitTestCase_3

Test Case ID	F2_tanNinetyCheck_3
Requirement ID	F2-R3
Action	The user clicks the button "Tan" and gives an input 90 (degree) and then click result(=) button.
Input(s)	$tan(90)$
Expected Output	undefined
Actual Output	undefined
Test Result	Success

Test Case : F2_UnitTestCase_4

Test Case ID	F2_tanNegativeValueCheck_4
Requirement ID	F2-R4
Action	The user clicks the button "Tan" and gives an input 95 (degree) and then click result(=) button.
Input(s)	$tan(95)$
Expected Output	-11.43005230
Actual Output	-11.43005230
Test Result	Success

Test Case : F2_UnitTestCase_5

Test Case ID	F2_tanNegativeNumberCheck_5
Requirement ID	F2-R5
Action	The user clicks the button "Tan" and gives an input -10 (degree) and then click result(=) button.
Input(s)	$tan(-10)$
Expected Output	-0.17723233
Actual Output	-0.17723233
Test Result	Success

Test Case : F2_UnitTestCase_6

Test Case ID	F2_tanOneHundredAndEightyCheck_6
Requirement ID	F2-R6
Action	The user clicks the button "Tan" and gives an input 180 (degree) and then click result(=) button.
Input(s)	$tan(180)$
Expected Output	0
Actual Output	0
Test Result	Success

Test Case : F2_UnitTestCase_7

Test Case ID	F2_getRadCheck_7
Requirement ID	F2-R7
Action	To make sure that radian function in $tan(x)$ is working properly, I had to do the unit test of Rad(x) and gives an input for $x = 90$ (degree).
Input(s)	$Rad(90)$
Expected Output	1.57079633
Actual Output	1.57079633
Test Result	Success

Test Case : F2_UnitTestCase_8

Test Case ID	F2_getRadOneHundredAndEightyCheck_8
Requirement ID	F2-R8
Action	To make sure that radian function in $tan(x)$ is working properly, I had to do the unit test of Rad(x) and gives an input for $x = 180$ (degree).
Input(s)	$Rad(180)$
Expected Output	3.14159
Actual Output	3.14159
Test Result	Success

Test Case : F2_UnitTestCase_9

Test Case ID	F2_getSinZeroCheck_9
Requirement ID	F2-R9
Action	To make sure that $sin(x)$ function for $tan(x)$ is working properly, I had to do the unit test of $sin(x)$ function and gives an input for 0 (degree).
Input(s)	$sin(0)$
Expected Output	0.0
Actual Output	0.0
Test Result	Success

Test Case : F2_UnitTestCase_10

Test Case ID	F2_getSinFortyCheck_10
Requirement ID	F2-R10
Action	To make sure that $sin(x)$ function for $tan(x)$ is working properly, I had to do the unit test of $sin(x)$ function and gives an input for 40 (degree).
Input(s)	$sin(40)$
Expected Output	0.642788
Actual Output	0.642788
Test Result	Success

Test Case : F2_UnitTestCase_11

Test Case ID	F2_getCosZeroCheck_11
Requirement ID	F2-R11
Action	To make sure that $cos(x)$ function for $tan(x)$ is working properly, I had to do the unit test of $cos(x)$ function and gives an input for 0 (degree).
Input(s)	$cos(0)$
Expected Output	1
Actual Output	1
Test Result	Success

Test Case : F2_UnitTestCase_12

Test Case ID	F2_getCosFortyCheck_12
Requirement ID	F2-R12
Action	To make sure that $cos(x)$ function for $tan(x)$ is working properly, I had to do the unit test of $cos(x)$ function and gives an input for 40 (degree).
Input(s)	$cos(40)$
Expected Output	0.76604305
Actual Output	0.76604305
Test Result	Success

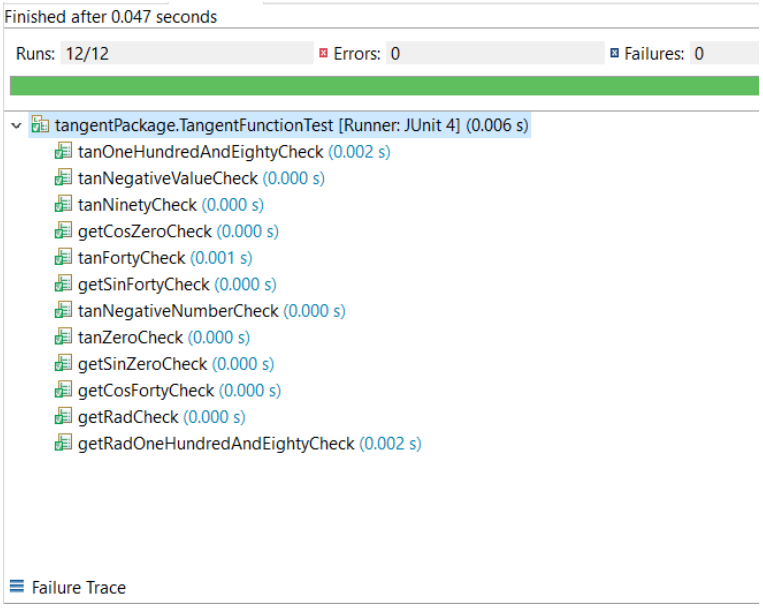

Figure: Unit Testing results for tangent function ($tan(x)$)

PROBLEM 6 - F3: Hyperbolic Sine, $sinh(x)$

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A variety of JUnit 5 tests were created in *SinhLibrariesTest.java* to test the quality of the *sinh* function. These were made as atomically as possible per guidelines on writing unit tests. For example, one unit test ensures that $sinh(0)$ returns 0, while another ensures that $sinh(1)$ returns 1.175. Despite it not being explicitly required, the subordinate functions also have unit tests. This is valuable since the *sinh* function largely depends on them for its level of accuracy, and it may allow an incorrect result for *sinh* to be immediately traced to a change in a subordinate function.

There were two requirements, which quickly summarized are that the function returns accurate values according to the equation in problem 1, and that the function may return the result within three seconds. Only this former requirement has unit tests since it is inadvisable to make unit tests to ensure something happens within a specific period of time. Tests that do so could randomly fail or differ between machines, which goes against the purpose and guidelines for writing unit tests.

PROBLEM 6 - F5

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Unit Test Case for F5 Function

The unit test cases for ab^x function is done using related functions of **JUnit 4**

Test Case : F5_UnitTestCase_1

Test Case ID	F5testF5
Requirement ID	F5-R1
Action	Test ab^x. a is set to 0, check the output result; x input is 0, check the output result
Input(s)	a=0,b=19,x=2; a=2,b=10,x=0
Expected Output	0; 2 (there are 2 sets of inputs so 2 sets of outputs,0 and 2)
Actual Output	0; 2(there are 2 sets of inputs so 2 sets of outputs,0 and 2)
Test Result	Success

Test Case : F5_UnitTestCase_2

Test Case ID	F5testF5PositiveX
Requirement ID	F5-R2
Action	Test ab^x.the input of x is a positive number, check the output result
Input(s)	a=1.0,b=3.4,x=5.6
Expected Output	946.8516393
Actual Output	946.8516393
Test Result	Success

Test Case : F5_UnitTestCase_3

Test Case ID	F5testF5NegativeX
Requirement ID	F5-R3
Action	Test ab^x.the input of x is a negative number, check the output result
Input(s)	a=1.0,b=3.4,x=-5.6
Expected Output	0.0021122
Actual Output	0.0021122
Test Result	Success

Test Case : F5_UnitTestCase_4

Test Case ID	F5testF5NegativeX
Requirement ID	F5-R4
Action	Test power(double,int) function
Input(s)	power(1.6,7)
Expected Output	26.8435456
Actual Output	26.8435456
Test Result	Success

Test Case : F5_UnitTestCase_4

Test Case ID	F5testF5NegativeX
Requirement ID	F5-R5
Action	Test power(double,int) function
Input(s)	power(1.6,7)
Expected Output	26.8435456
Actual Output	26.8435456
Test Result	Success

Test Case : F5_UnitTestCase_5

Test Case ID	F5testDecimalPower
Requirement ID	F5-R6
Action	Test power(double,double) function
Input(s)	power(5.6, 7.5)
Expected Output	408705.2369134
Actual Output	408705.2369134
Test Result	Success

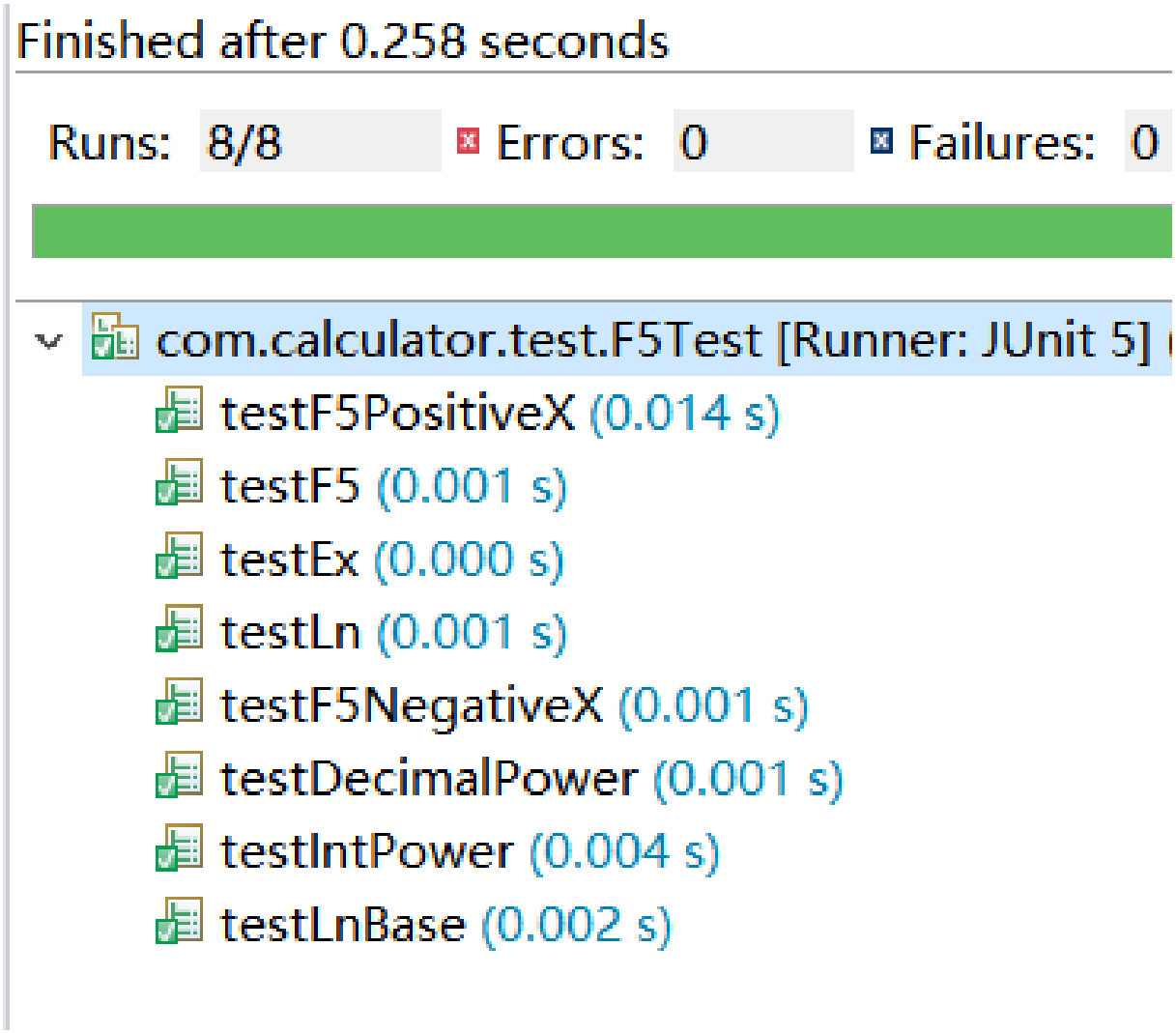

Figure 1: Figure: Unit Testing results for function ab^x

PROBLEM 6 - F7 : x^y

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Problem 6 - Unit Test Case Description

This section presents the unit test cases implemented using **JUnit4** for Super Calculator (F7-Power Function) which are traceable to requirements.

Test Case : F7_TestCase_1

Test Case ID	F7_TestCase_1
Requirement ID	F7-R1
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = 0.0, exponent = 0.0
Expected Output	1.0
Actual Output	1.0
Test Result	Success

Test Case : F7_TestCase_2

Test Case ID	F7_TestCase_2
Requirement ID	F7-R2
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = 0.0, exponent = 3.0
Expected Output	0.0
Actual Output	0.0
Test Result	Success

Test Case : F7_TestCase_3

Test Case ID	F7_TestCase_3
Requirement ID	F7-R3
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = 7.0, exponent = 0.0
Expected Output	1.0
Actual Output	1.0
Test Result	Success

Test Case : F7_TestCase_4

Test Case ID	F7_TestCase_4
Requirement ID	F7-R4
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = -4.0, exponent = 0.0
Expected Output	1.0
Actual Output	1.0
Test Result	Success

Test Case : F7_TestCase_5

Test Case ID	F7_TestCase_5
Requirement ID	F7-R5
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = 7.0, exponent = 1.0
Expected Output	7.0
Actual Output	7.0
Test Result	Success

Test Case : F7_TestCase_6

Test Case ID	F7_TestCase_6
Requirement ID	F7-R6
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = 5, exponent = 9
Expected Output	1953125.0
Actual Output	1953125.0
Test Result	Success

Test Case : F7_TestCase_7

Test Case ID	F7_TestCase_7
Requirement ID	F7-R6
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = -3, exponent = 4.4
Expected Output	3.1631
Actual Output	3.1631
Test Result	Success

Test Case : F7_TestCase_8

Test Case ID	F7_TestCase_8
Requirement ID	F7-R6
Action	The user inputs a base input and click power function button followed by giving exponent input and click result(=) button.
Input(s)	base = -9, exponent = 3
Expected Output	-729
Actual Output	-729
Test Result	Success

Test Case Results for F7

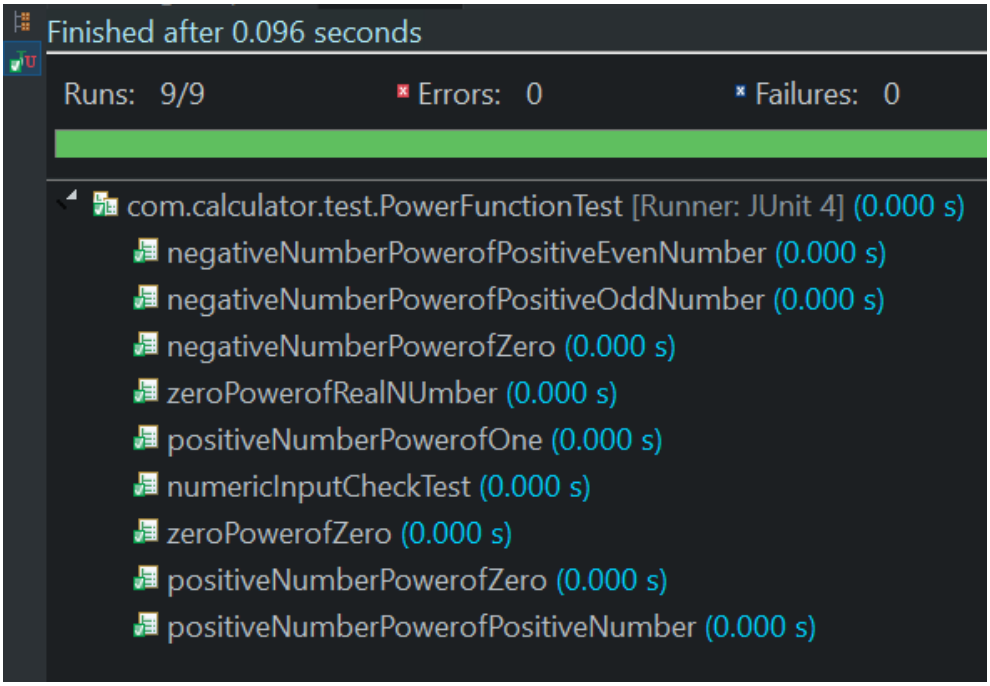

Figure 2: Test case result of function F7 : x^y using Junit4