Documentation Template Paper

CSC 414 Software Design

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1.0 – Scope

The program will perform some basic mathematical calculations. It is to include addition, subtraction, multiplication, division, averaging, squaring, find the square root, display decimal value as a fraction, and find the lowest common denominator. It will only preform these operations for real numbers. It will not include any graphing abilities, any polynomial calculations, or other mathematical operations not listed above. This version will not include a GUI but may be an improvement made in a later version.

1.1 – Identification

This written document was written for the program called 'Basic Calculator v1.0.0' in the file titled *BasicCalculatorV1.jar*. Any and all information provided here will only be for this specific program and version. Please see other documentation for the appropriate version as applicable.

1.2 – System Overview

'Basic Calculator v1.0.0' was created to preform basic mathematical calculations and will later be incorporated into a larger program. It will preform calculations for real numbers only and only takes input and output through a terminal window. In later versions it will be combined with a polynomial calculator that preforms the same basic calculations and generate a GUI to take user input rather than using the terminal.

1.3 – Document Overview

The purpose of this document is to go over the requirements, design and test plan for 'Basic Calculator v1.0.0[.]' The requirements will be put into a table format with referenced to the design, test plan, and test results for each portion. The design will detail how the requirements will be fulfilled. The test plan will detail how the design is tested. After all of that there will be the appendix which will include the test results for the program.

2.0 – References

This project can be found at the following link as code and runnable .jar file:
https://github.com/rtrawick/CSC414homework/tree/master/ProjectDevelopment

4.0 – Requirements

Requirement Source	Requirement Identifier	Requirement Statement	Design Section Identifier	Test Section Identifier	Pass/Fail
	1.00	**General Requirements - Main Class**			
Stubbing Project	1.01	Shall take a selection from the user to start a process	1.01	1.01	P
Stubbing Project	1.02	Shall take input from the user to apply the selected process	1.02	1.02	P

Stubbing Project	1.03	Shall output the correct calculation to the console	1.03	1.03	P
Stubbing Project	1.04	An error message will be output to the console for any invalid option selection in the menu, and re-load the menu until a correct option is selected	1.04	1.04	P
Stubbing Project	1.05	An error message will be output to the console for any invalid input in any chosen process, and allow a new input until a correct input is chosen	1.05	1.05	P
Stubbing Project	1.06	Shall loop to the menu until the exit option is chosen	1.06	1.06	P
	2.00	**Mathematical Calculations - Functions**			
Stubbing Project	2.01	Shall add 2 given integers together and return the value	2.01	2.01	P
Stubbing Project	2.02	Shall subtract the first given integer from the second and return the value	2.02	2.02	P
Stubbing Project	2.03	Shall multiply 2 given integers together and return the value	2.03	2.03	P
Stubbing Project	2.04	Shall divide the first given integer by the second and return the value	2.04	2.04	P
Stubbing Project	2.05	Shall return the average of 2 given integers	2.05	2.05	P
Stubbing Project	2.06	Shall take a double value and return the same value as a fraction	2.06	2.06	P
Stubbing Project	2.07	Shall return the square of a given integer	2.07	2.07	P
Stubbing Project	2.08	Shall return the double value of the square root of a given integer	2.08	2.08	P
Stubbing Project	2.09	Shall return the lowest common denominator of 2 given integers	2.09	2.09	P

4.0 – Design

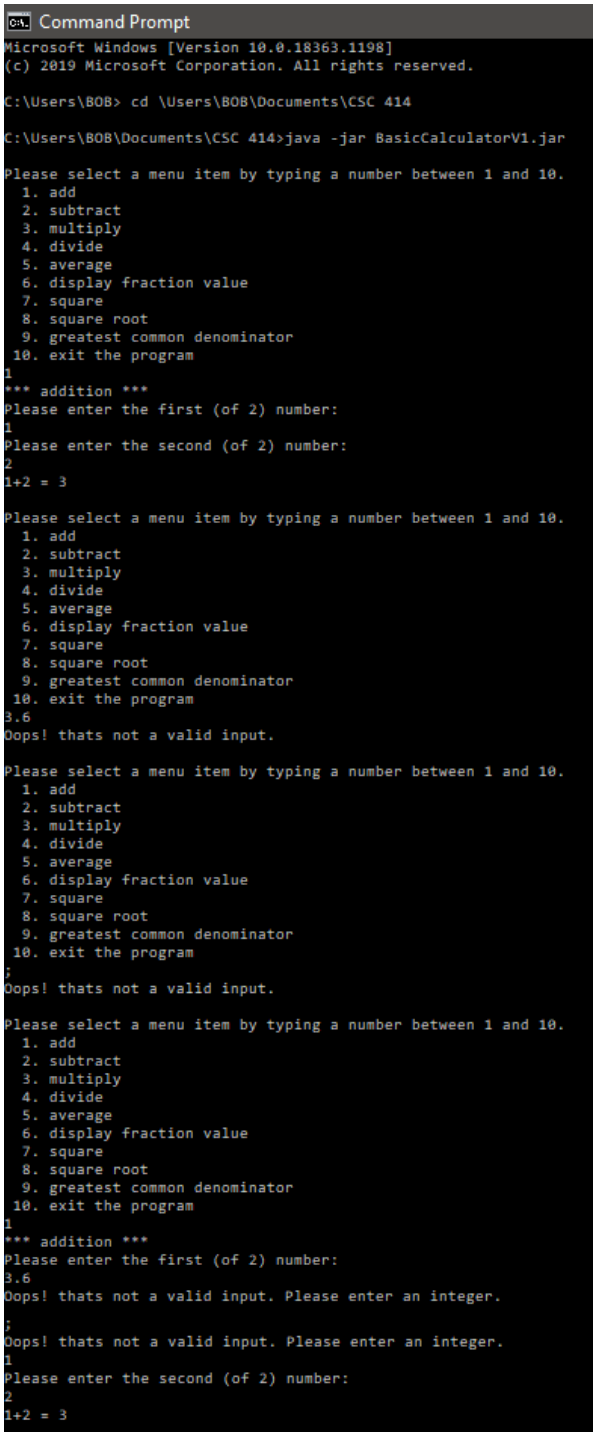
This program will be written in java and will be exported as a runnable jar file. It will be able to run on any modern computer in this year 2020 that has Java installed. One will need to open a terminal, change the directory to the folder containing the jar file, then type ‘java -jar BasicCalculatorV1.jar’ to run the program in the terminal window.

Design Identifier	Design Statement
1.00	**General Design - Main Class**
1.01	The program takes the users input and uses if statements to compare the input to corresponding number options until it finds the if statement with the users chosen process choice.
1.02	After selecting a process, the program takes the next input(s) as appropriate to run the corresponding function. For example, if a user chose option '1. addition', the program would then take the next two integer inputs.
1.03	Each function outputs the operation in appropriate arithmetic format or in word format then the answer after calculation.
1.04	This is done with an if statement to catch any incorrect integer input, and a try block that will continue to loop until an integer is entered
1.05	This is also accomplished with try blocks. A try block is located just before each function call to make sure any input is appropriate for the function. Like before it is looped until the input is correct (of int or double type depending on the function being called).
1.06	The menu and operations located in the main class are looped in a do while loop so that it will start then continue to repeat until the user enters the number '10'.
2.00	**Mathematical Calculations - Functions**
2.01	Function add takes integer x and integer y, then sets integer answer to x+y.
2.02	Function subtract takes integer x and integer y, then sets integer answer to x-y.
2.03	Function multiply takes integer x and integer y, then sets integer answer to x*y.
2.04	Function divide takes integer x and integer y, then sets integer answer to x/y.
2.05	Function average takes integer x and integer y, then sets integer answer to (x+y)/2.
2.06	Function fraction takes double x, duplicates x in startX to print the original value of x in the terminal at the end, stores the string value of x in stringX, uses stringX to get the count of numbers after the decimal, create new integer 'denominator', it then uses that count in a for loop to multiply x and 'denominator' by 10 as many times as count. Next it is created integer 'numorator' and set to the rounded value of x. The same method that is used in function greatestCommonDenominator, is now used to find the greatest common denominator of numorator and denominator. Finally, numorator and denominator are divided by their greatest common denominator and then stored in String answer as '[numorator]/[denominator]'.
2.07	Function square takes integer x, then sets integer answer to x*x.
2.08	Function squareRoot takes double x, then sets double answer to sqrt(x). Uses the Math.sqrt() function from the 'java.lang.Math' package.
2.09	Function greatestCommonDenominator takes integer x and integer y, sets integer answer to 1, starts a for loop with a double condition that i must be less than or equal to both x and y to continue the loop, inside the for loop is an if loop that if the remainder of x/i and y/i are both 0 then answer is set to the value of i.

5.0 – Test Plan

Test Identifier	Test Statement
1.00	**General - Main Class**
1.01	Give a correct input when prompted and see if it pulls up the selected choice.
1.02	Give appropriate input when prompted for the function.
1.03	Check for output after giving input.
1.04	Check to see if it loops an error message and re-displays the menu and allows for new input until the input is valid.
1.05	Check to see if it loops an error message and allows for new input until the input is valid.
1.06	Enter the number '10' and the program will exit.
2.00	**Mathematical Calculations - Functions**
2.01	Choose the add option from the menu, give appropriate input, and check the math when the answer is displayed.
2.02	Choose the subtract option from the menu, give appropriate input, and check the math when the answer is displayed.
2.03	Choose the multiply option from the menu, give appropriate input, and check the math when the answer is displayed.
2.04	Choose the divide option from the menu, give appropriate input, and check the math when the answer is displayed.
2.05	Choose the average option from the menu, give appropriate input, and check the math when the answer is displayed.
2.06	Choose the display fraction value option from the menu, give appropriate input, and check the math when the answer is displayed.
2.07	Choose the square option from the menu, give appropriate input, and check the math when the answer is displayed.
2.08	Choose the square root option from the menu, give appropriate input, and check the math when the answer is displayed.
2.09	Choose the greatest common denominator option from the menu, give appropriate input, and check the math when the answer is displayed.

Appendix – Test Results



Open Command Prompt in windows.

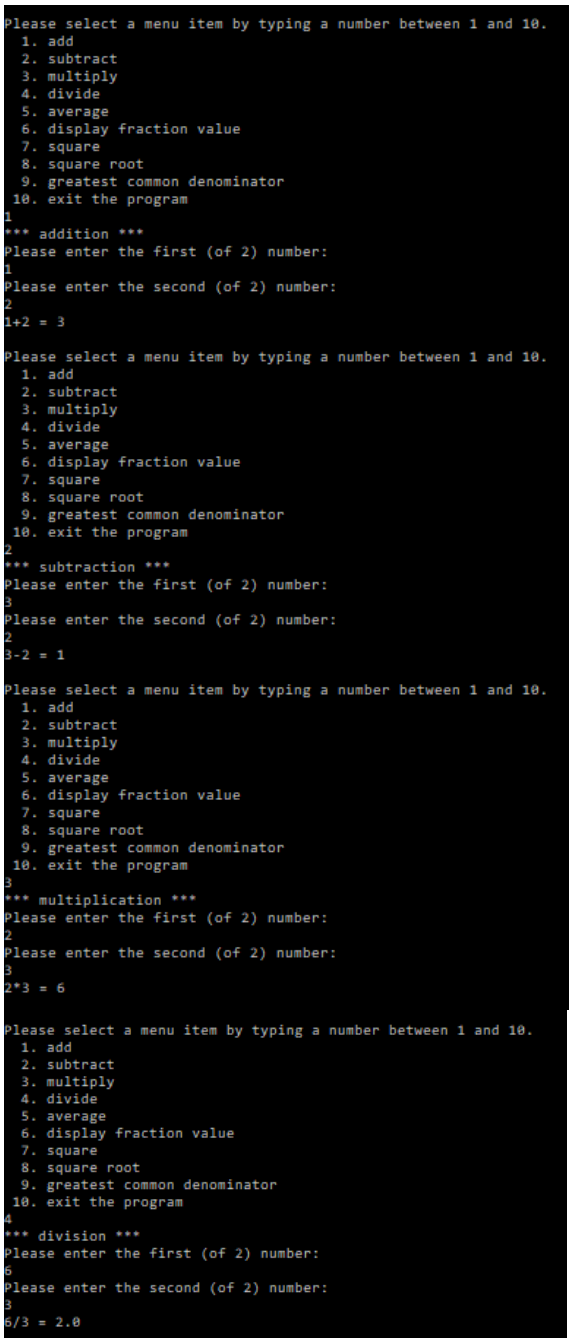
Navigate to folder that contains 'BasicCalculatorV1.jar' and run it.

1.01 – passes test

1.02 – passes test

1.04 – passes test on 2 accounts

1.05– passes test

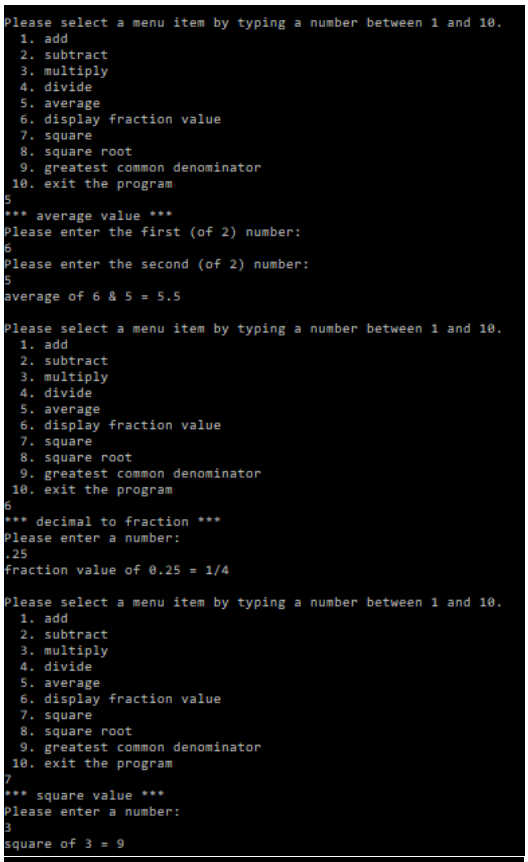


2.01 & 1.03 – passes tests

2.02 & 1.03 – passes tests

2.03 & 1.03 – passes tests

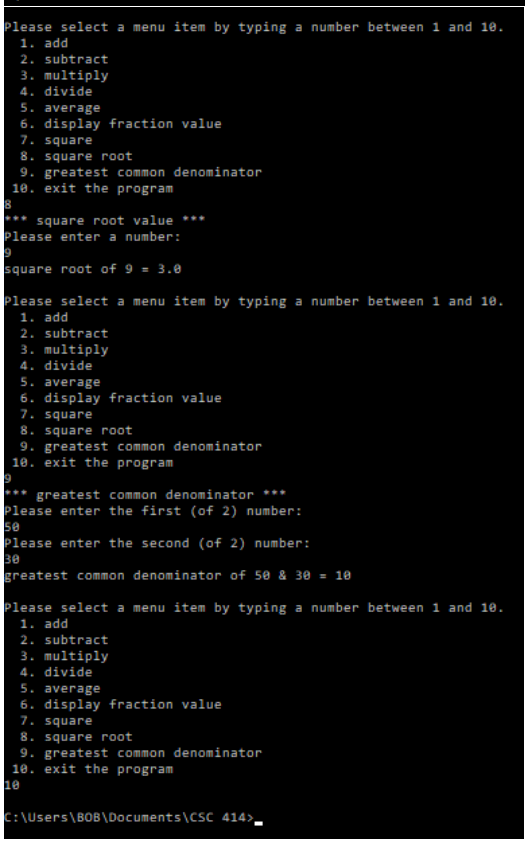
2.04 & 1.03 – passes tests



2.05 & 1.03 – passes tests

2.06 & 1.03 – passes tests

2.07 & 1.03 – passes tests



2.08 & 1.03 – passes tests

2.09 & 1.03 – passes tests

1.06 – passes test