**The Function Calculator**

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**Introduction**

“The Function Calculator” was an assignment issued by Dr. Phillip Ogden for the class CS 231. The purpose of this project was to create a program that would be capable of performing five different mathematical functions: square root, cube, natural logarithm, inverse, and absolute value. Once the user has chosen a function, the program will prompt the user for a number, calculate the necessary operations, and output the result.

**Methodology**

I included iostream and cmath in the program as well as using namespace standard, and I set up an empty double variable which would later accept the user input. Next, I created void functions for each of the six operations. Within each function, the program would confirm the user’s choice of operation and prompt the user for the number, including any stipulations or restrictions on that number. For the square root and natural logarithm functions it needs to be positive, and for the natural logarithm and inverse functions it cannot be equal to zero. Otherwise, the input can be any floating point number. I used if/else statements to make sure the number input by the user is valid. When it isn’t, the user receives a statement letting them know that their input is invalid and is taken back to the start of the program.

Within the main section of the program, there is an integer variable which will accept the value entered by the user to choose between the five operations or exiting. I put a while loop around the entire rest of the main to make sure that the program doesn’t end until the user asks to exit the program. The first thing the user sees when starting the program is the menu, which displays all the options. The user can choose: 1 for square root, 2 for cube, 3 for natural logarithm, 4 for inverse, 5 for absolute value, or 0 to exit the program. Next, I have a switch case which interperts the choice made by the user and either calls the appropriate function, ends the program, or displays an error message (if the user enters an invalid response).

**Results**

The program works well and currently contains no errors, but originally I had mistakenly allowed the user to enter 0 as a valid option for the natural logarithm, which caused a divide by zero error at runtime if the user attempted to take the natural logarithm of 0. Thankfully this mistake was brought to my attention, so I corrected it.

**Conclusions**

Over the process of making this project, I learned how to utilize switch cases in C++. If I were to go back and change anything in this project, I would add more mathematical functions. It would be very straightforward to simply add more void functions before the main, more menu options, and more options in the switch case. I’m not sure which mathematical operations would be a good fit with the rest of the program, though.