

Programming Assignment #2

Learning Objectives:

You will get practice in this assignment in the following areas in C/C++:

- Writing a simple C++ program
- Compiling and linking
- If Statements and Switch Statements
- Simple arithmetic statements
- Standard Input and output
- Variable Declaration
- Simple functions
- Good programming practices

Description:

You are to write a simple C++ program that gives the user the ability perform the following calculations.

1. Square Root (cannot be a negative number)
2. Cube
3. Natural logarithm(cannot be a negative number)
4. Inverse
5. Absolute value

Programming Specifications:

Your program will display a menu and give the user the choice of 6 options. To calculate the square root of a number, the cube of a number, the natural logarithm of a number, the inverse of a number, the absolute value of a number, or to exit the program.

- The main routine continues to execute until the user selects the option to exit.
- Your program may assume that only digits and a period will be entered and not letters or special characters.
- When the user selects the option to calculate the Square Root, Cube, Natural log, Inverse or Absolute value of a number, a function without parameters will be called which will prompt the user to enter a decimal number, calculate the value, and output the results.
- If the user inputs an incorrect menu option, your program will ignore it and redisplay the menu.
- If the user inputs an incorrect value, such as a negative number for the Square Root, you will display a message and return from the function. You are not required to ask them to re-enter the number.
- Enter the menu options as single characters and treat them like characters in the program.

CGS3406 Intro to Programming Using C++

Required Algorithms

In order to make this program work, you will have to include the C++ math library header.

#include <cmath>

You will also need to use the following functions that are contained in the math library. They are available to you just by including the cmath library. Here are sample calls to the functions. The following code is just an "example" of how to use the functions and does not necessarily represent solutions to the homework assignment.

```
double inputnumber;
cout << "Enter a floating point number: ";
cin >> inputnumber;

cout << "The square root of " << inputnumber << " is " << sqrt(inputnumber) << endl;
cout << "The natural log of " << inputnumber << " is " << log(inputnumber) << endl;
cout << inputnumber << " raised to the third power is " << pow(inputnumber,3) << endl;
cout << "The absolute value of " << inputnumber << " is " << fabs(inputnumber) << endl;
cout << "The inverse of " << inputnumber << " is " << 1.0/inputnumber << endl;
```

Grading Criteria:

- The program compiles. If the program does not compile no further grading can be accomplished. Programs that do not compile will receive a zero.
- (25 Points) The program executes without exception and produces output. The grading of the output cannot be accomplished unless the program executes.
- (25 Points) The program produces the correct output.
- (25 Points) The program specifications are followed.
 - (10 Points) your program must continue to work until exit is selected.
 - (7.5 Points) Incorrect menu options are ignored
 - (7.5 Points) Your program recognizes improper numbers (negative on square root and natural log)
- (10 Points) The program is documented (commented) properly.
- (5 Points) Use constants when values are not to be changed
- (5 Points) Use proper indentation
- (5 Points) Use good naming standards

Bonus

- (5 points) Use a switch statement to control operation of user selected menu option.

Sample Program Run:

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 1
Enter in a non-negative decimal number:
The square root of 27 is 5.19615

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 2
Enter in a decimal number:
The Cube of 3 is 27.0

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 3
Enter in a decimal number: 25.6
The Natural Log of 25.6 is 3.24259

CGS3406 Intro to Programming Using C++

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 4
Enter in a decimal number: 10.0
The Inverse of 10.0 is 0.1

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 5
Enter in a decimal number: -25.0
The Absolute Value of -25.0 is 25.0

M E N U

- 1 - Calculate Square Root
- 2 - Calculate Cube
- 3 - Calculate Natural Logarithm
- 4 - Calculate Inverse
- 5 - Calculate Absolute Value
- 0 - Exit Program

Enter Menu Option = 0
Goodbye !