InClass 8 -Using & Writing Functions

Goal

In this project, you use some basic library functions and then write several of your own functions. This assignment consists of prompting for and reading several different input values and calling various functions on the input, some of the functions you write as part of the assignment.

Learning Objectives

- How to call library functions
- The importance of data types in function parameters. see the last page of this assignment for warnings about submitting to Web-CAT!!!
- How to write your own functions
  - To write function prototypes
  - Make function calls
  - Write function implementation code

Program Features

See the output below for clarification.

1. **Call library functions**, abs()
   a. Read 1 double input values, e.g. num1
   b. Output the absolute value of num1

The rest of these you need to **write** the functions yourself. I will provide lots of help with the code that goes ***inside*** the functions so that you can focus on ***calling*** and *setting up* the functions. Don't forget to put a prototype at the top of the file after your `using namespace std;` statement. Most of these function return a value that your program outputs, except for the last function, which just prints something.

2. **Write a function** that prints a line as shown below (the first line). The function returns nothing; it just produces output.
   a. Output "This assignment uses and has us write several functions!!!"
   b. prototype: void printHeader();
   c. You should call this function even before your first call for #1 and #2 so it appears at the top of your output, see sample output below.
3. **Write a function**, called sumDigits(), that sumsup the digits of the number
   a. Prompt the user for a number in main() and use it for the parameter for this function call, "`Enter a long number: `"
   b. Return the added up digits in the number, e.g. for input 3679, you output 25 (because 3 + 6 + 7 + 9 = 25)
   c. Access each digit using % 10, and 'cut off' the last digit using / 10
   d. prototype: int sumDigits (long val);
   e. cout for this must be in main()
4. **Write a function** called sumUp() to add up the numbers from 1 to input, if the input is less than or equal to 111111. (You need an if statement in the function before you start the loop.)
   a. Again use the same number from #3 for the parameter

b. Return the added up numbers from 1 to the number entered, e.g. the sum for 22222 is 246919753; the sum for 10 is 55.
c. If the input is above 111111, output "Too big!"and return 0 (You must use an if statement.)
f. prototype: long sumUp(long value);
d. cout for this must be in main()

5. **Write a function** called average2() that averages the 2 double values passed in as parameters and returns that average
   a. prototype: double average2(double num1, double num2);
   b. Prompt and read 2 double numbers in main()
   c. num1 and num2 not changed
   d. Return the average value of num1 and num2 by the function
   e. cout for this must be in main()
6. **Write a function** called up() that returns the upper case letter of the value passed into it. If the parameter is NOT a lower case letter a-z, then the function returns the same value passed into the function, e.g. parameter = 'c' returns 'C', parameter = 'R' returns 'R', and parameter = '$' returns '$'.
   a. prototype: char up(char letter);
   b. Prompt and read 1 char in main()
   c. letter not changed
   d. If the letter is a lowercase letter, convert it to uppercase and return it. If not , return it directly.
   e. cout for this must be in main()

Example I/O (This shows 2 runs of the program.)

```
This assignment uses and has us write several functions!!!
Enter a number (double): -1.618
Absolute value: 1.6180

Enter a long number: 898
Digits sum: 25
Sum up: 403651

Enter 2 numbers (doubles):20 30
The average value: 25.0000

Enter a letter(char): +
The uppercase: +

==================    second example ====================
This assignment uses and has us write several functions!!!
Enter a number (double): 1.618
Absolute value: 1.6180

Enter a long number: 99991
Digits sum: 37
Sum up: 704182740

Enter 2 numbers (doubles):20 30
```

```
The average value: 25.0000

Enter a letter(char): A
The uppercase: A
```

To get your going on this (and make the assignment a reasonable size!), here is your main() program:

```
// You need to add #includes,
// using namespace std, and function prototypes.
int main()
{
     double num1, absnum1, average;
     long inlong, sumd, sumup;
     char letter;

     printHeader();      // #2

     cout<< "Enter a number (double): " << fixed <<setprecision(4);
     cin>> num1;
     absnum1 =       ;    // add function call #1
     cout<< "Absolute value: " << absnum1 << endl;


     cout<< "\nEnter a long number: ";
     cin>> inlong;
     sumd =         ;    // add function call  #3
     cout<< "Digits sum: " <<sumd<<endl;

     sumup =        ;    // add function call #4
     cout<< "Sum up: " << sumup <<endl;

     cout<< "Enter 2 numbers(doubles): ";
     cin>> num1 >> num2;
     average =        ; // add function call #5
     cout<< "The average value: "<< average <<endl;

     cout<< "Enter a letter(char): " <<endl;
     cin>> letter;
     letter =                 ; //add function call #6
     cout<< "The uppercase: " << letter <<endl;

     return 0;
}
// all of your function MUST be written down here, below main()
```

You need to add #includes, using namespace, and prototypes. Then, you append the required functions below the main() function.

Submit your program to Web-CAT

For this assignment, Web-CAT will not only check the output of your program against the required output, the testing code will **call your functions**, check the return values, and check the output. If you do not correctly write the functions **with the required parameters** and return values, then your code may not even compile on Web-CAT ***even though your program runs perfectly fine on your computer***. That is because my test code is expecting (and requiring) the functions to match the assignment. If your code does not match the assignment, then my code and Web-CAT cannot compile, let along run your incorrect functions; it cannot "find" them.