Lab 6: Value-returning functions

Problem: You will be have to round numbers very often so you decided to create your own function round_off() that will receive the number to be rounded and the number of decimal digits that the number should be rounded to and will return the value rounded to the specified number of decimal digits.
You need to create a program to test the function. It will ask the user to enter the double precision real number to be rounded and a whole number indicating the number of decimal digits. It will then display the original number with ten digits and the rounded value (also a double precision real number) with the number of digits specified by the user plus 2 more.

This assignment will be completed in two steps:

1) First you will implement the algorithm shown below in which the rounding will be done in main()

2) Once you have this working you will need to modify your solution so you:
   Declare the prototype of the function above main()
   Call the function in main() to do the rounding
   Define the function below main()

Your task: implement in C++ the algorithm solution shown below for the first step.

Algorithm solution (in pseudocode):

To solve this problem your program must perform the following tasks:

1. 5 points. Declare variable value, valuero that hold double precision real numbers
2. 5 points. Declare variable decdig that holds whole numbers
3. 8 points. Prompt the user to "Enter the real number: "
4. 8 points. Read from keyboard the value entered by the user and assign it to value
5. 8 points. Prompt the user to "Enter number of digits: "
6. 8 points. Read from keyboard the value entered by the user and assign it to decdig
7. 24 points. Round the real number to the number of decimal digits specified and assign the result to valuero
8. 8 points. Format the output to display the numbers in fixed format with ten decimal digits
9. 8 points. Display on the screen, using 23 columns, the message
   "The original number is ", value
10. 10 points. Format the output to display the numbers in fixed format with the number of decimal digits specified plus 2
11. 8 points. Display on the screen, using 23 columns, the message
    "The rounded number is ", valuero

The program must compile without errors or warnings.

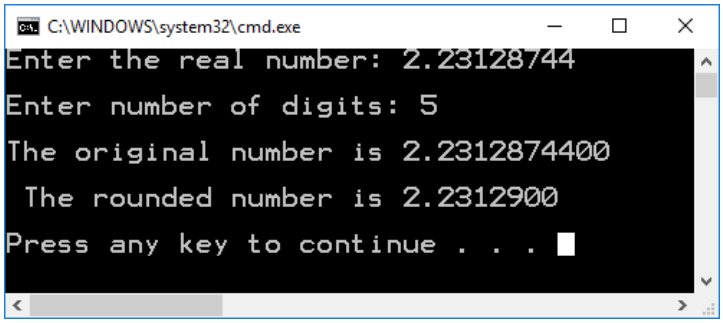
Important:
Once you have this program working you will modify it according to step 2.
There are comments in the provided cpp file that indicate where you have to insert the prototype and define the function.
The call to the function will be done in the statement where you do the rounding in main().

Create a project if necessary (or use one that is already open) and **add the existing item** named **lab06_FML.cpp** (provided with this handout).

Implement the above algorithm (already provided in the source code as comments).

Note:

- Do NOT remove or modify the statements that I use to test certain things in your program.
- Run my sample solution to know how your program must behave. Pay attention to the input and the output formats. Your solution must behave exactly like mine.
- Carefully analyze the following figure and use it as a reference to ensure you do the right things.



- Test and compare your solution with mine for different values of the number and the number of digits to ensure they always produce the same outputs. Pay attention to the output format.
- Ensure your formulas do not use mixed data types.

To write your program, review the concepts learned in class (review examples discussed in class) and read the book (analyze the examples in it).

I am posting my solution for your reference. Please run it and ensure that your program works like mine. If you get an error message on the output, read the comment on the line specified in the message to find out what is wrong. If you have concerns or specific questions, post them on the Discussion Board of Blackboard.
Don't forget to include at the top of the program the comments shown below with your information (name, class and section number, etc.)

```
//////////////////////////////////////////////////////////////////////
//
```

```
// Name: <Put your name here>
// Date: <Today's date>
// Class: <Your class number and section number, like: CSCI 1370.02>
// Semester: <This semester, like: Spring 2012>
// CSCI/CMPE 1370 Instructor: <Your lecture instructor's name>
//
// Program Description: Enter here your description of what the program does
//
////////////////////////////////////////////////////////////////////
```

Please rename your file **lab06_FML.cpp** (replace F, M. and L with the initials of your first, middle (if any), and last names). Do not include blank spaces in the name of the file please.

When done, submit your solution through Blackboard using the "Assignments" tool. Do Not email it.

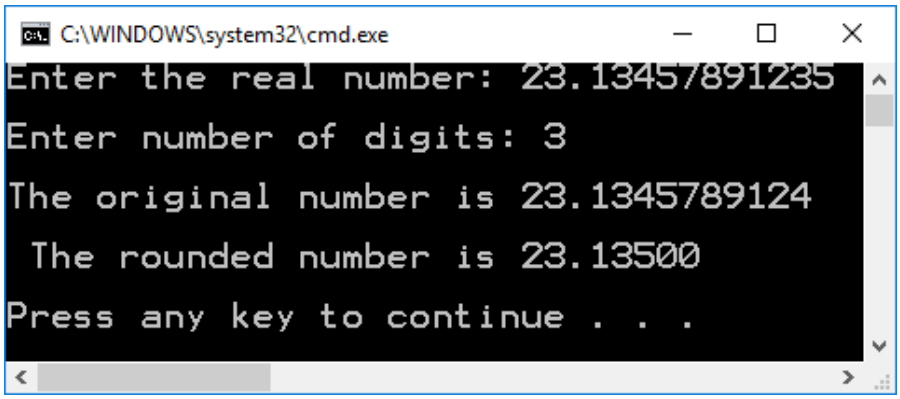
The following is the basic criteria to be used to grade your submission:

You start with 100 points and then lose points as you don't do something that is required.

-10: wrong variable names
-10: wrong data types
-10: no/too few comments
-10: mixed data types in expression
-15: didn't round the value off
-7: incorrect way to round the value off
-30: didn't implement the required function
-15: incorrect implementation of the function
-10: incorrect function call
-10: incorrect input format
-5: incorrect output format
-50: program doesn't compile
-10: Late

Important: more points may be lost for other reasons not specified here.

The following is another sample run of the program.


C:\WINDOWS\system32\cmd.exe
Enter the real number: 23.13457891235
Enter number of digits: 3
The original number is 23.1345789124
The rounded number is 23.13500
Press any key to continue . . .