<u>**Lab 5:**</u> Predefined functions   <u>**Due:**</u> 9/25/2020

Problem: Suppose that you have been hired as an Undergraduate Research Assistant to help Professor Cynthia Garcia. She will need to add the sine of an angle to the cosine of another angle in numerous occasions so she asks you to write a program that will get the two angles and calculate the addition of the sine of the first one with the cosine of the second one. The angles will be expressed in degrees. She needs the result of the addition with three decimal digits.

In order to learn how to use the functions to solve this problem use www.cplusplus.com

All the values that the program will need to work with must be **double precision real** numbers. Assume the value of PI to be 3.141592.

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

Algorithm solution (in pseudocode):

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

1. 5 points. Declares constant PI:3.141592
2. 5 points. Declares variable name that holds text
3. 7 points. Declares variables alpha,beta,sina,cosb, and total that hold double precision real numbers
4. 5 points. Prompts the user to "Please enter your full name: "
5. 5 points. Reads the full name from keyboard and stores it in the corresponding variable
6. 5 points. Prompts the user to "Please enter angle alpha: "
7. 5 points. Reads the value from the keyboard and stores it in the corresponding variable
8. 5 points. Prompts the user to "Please enter angle beta: "
9. 5 points. Reads the value from the keyboard and stores it in the corresponding variable
10. 5 points. Displays "Thanks ", name
11. 9 points. Calculates the sine of alpha and the cosine of beta, and stores the results in the corresponding variables
12. 9 points. Calculates the total as the addition of the sine and the cosine and stores it in the corresponding variable
13. 5 points. Formats the output to display the values in fixed format with three decimal digits
14. 5 points. Prints a message like the one below:
15. 5 points. Using 23 columns displays "sine of alpha: ", using 6 columns displays sina
16. 5 points. Using 23 columns displays "+ cosine of beta: " , using 6 columns displays cosb
17. 5 points. Using 30 columns displays "-------"
18. 5 points. Using 23 columns displays "total: ", using 6 columns displays total

==**IMPORTANT:** once your program is running according to what is specified by my algorithm modify it so it rounds the sine of alpha and the cosine of beta to three decimal digits right before these values are used to calculate the total. The rounded values must be reassigned to sina and cosb respectively. The final version of your program must include this modification.==
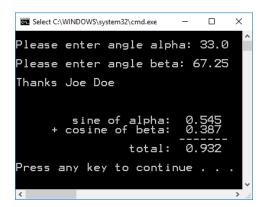
The program must compile without errors or warnings.

Create a project if necessary (or use one that is already open) and **add the existing item** named **lab05_FML.cpp** (provided with this handout).

Implement the above algorithm (already provided in the source code as comments). <mark>Your C++ statements MUST be right below EACH step they implement.</mark>

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.

```
Select C:\WINDOWS\system32\cmd.exe                    —    □    ✕

Please enter angle alpha: 33.0
Please enter angle beta: 67.25
Thanks Joe Doe


        sine of alpha:   0.545
    + cosine of beta:   0.387
                       -------
               total:   0.932
Press any key to continue . . .
```

Test and compare your solution with mine for different values of alpha and beta.
<mark>Use the following values for both alpha and beta to test your program and ensure it passes the tests:</mark>
   <mark>1) 33.0</mark>
   <mark>2) 66.45</mark>
   <mark>3) 87.33</mark>

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

<mark>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</mark>. 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 **lab05_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.

-5: program does not pass test (each)
-5: incorrect constant declaration
-5: wrong variable names
-5: wrong data types
-5: no/too few comments
-5: mixed data types in expression
-5: did not display the numbers with three decimal digits
-10: didn't round the value off
-5: incorrect way to round the value off
-15: didn't use predefined functions
-5: incorrect use of the function
-5: incorrect input format
-5: incorrect output format
-40: program doesn't compile
-10: Late

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