CSCI 1470 **Fall 2023** **Mr. Gustavo Dietrich**

Lab 5: Predefined functions **Due:** 9/27/23

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:

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

Open **lab05.cpp** in your IDE and implement the above algorithm (already provided in the source code as comments).

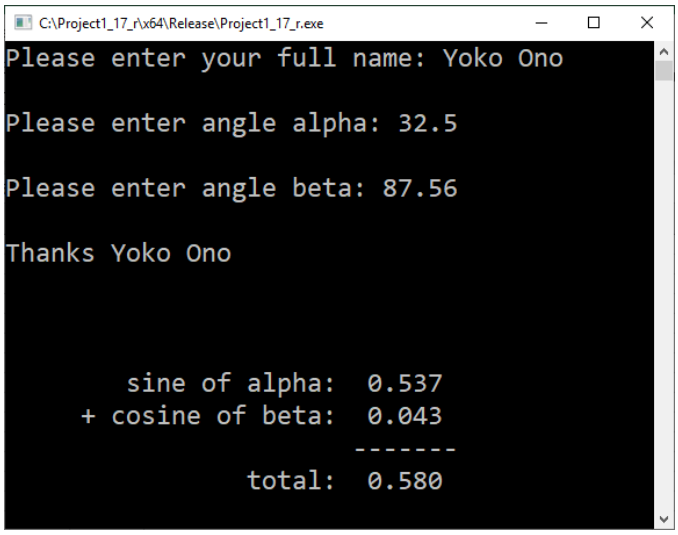
Implement the above algorithm (already provided in the source code as comments). **Your C++ statements MUST be right below EACH step they implement.**

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 (click on the link provided below). Pay attention to the input and the output formats. Your solution must behave exactly like mine.

  https://replit.com/@GDietrich/1470-lab05sample

- 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 alpha and beta.
Use the following values for both alpha and beta to test your program and ensure it passes the tests:

1) 33.0
2) 66.45
3) 87.33
4) 25.76
5) 25.89

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

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 1470.02>
// Semester: <This semester, like: Spring 2012>
// CSCI/CMPE 1470 Instructor: <Your lecture instructor's name>
//
// Program Description: Enter here your description of what the program does
//
////////////////////////////////////////////////////////////////
```

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

Paste the link to your solution and the source code in the textbox corresponding to Text Submission (click on the Write Submission button) before you click on Submit.

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

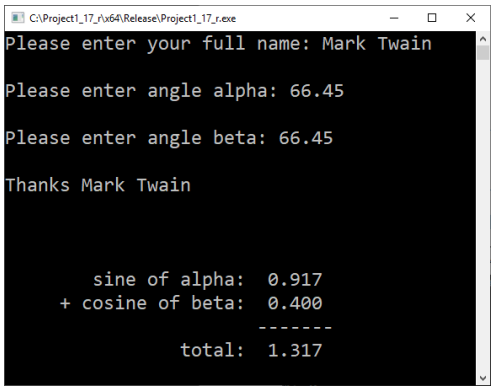
You start with 100 points and then lose points as you don't do something that is required.

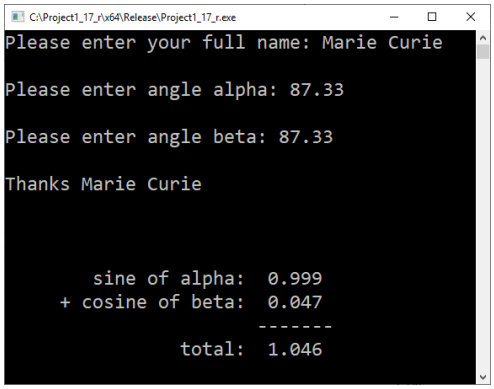
-10: didn't read a full name using a single variable
 -5: incorrect constant declaration
 -5: wrong variable names
 -5: wrong data types
 -5: no/too few comments
 -5: mixed data types in expression
 -5: did not display the numbers with three decimal digits
-10: didn't round the value off
 -5: incorrect way to round the value off
-15: didn't use predefined functions (each)
 -5: incorrect use of the function (each)
 -5: incorrect input format
 -5: incorrect output format
 -5: program does not pass test (each)
-10: missing libraries
-20: program does not implement the provided algorithm
 -5: Missing comments at the top of the program
-20: Incorrect/missing source code
-20: Incorrect/missing link to your Repl.it solution
-50: program doesn't compile

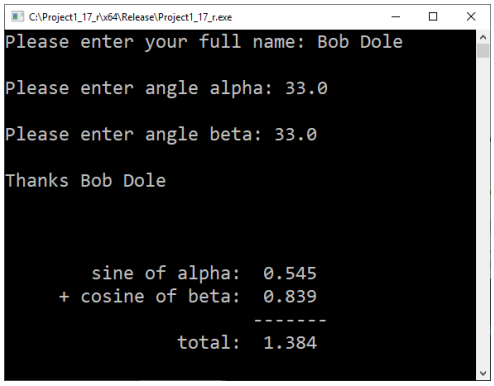
-100: The code submitted is not your creation (you got it from a web site or another person)
-10: Late

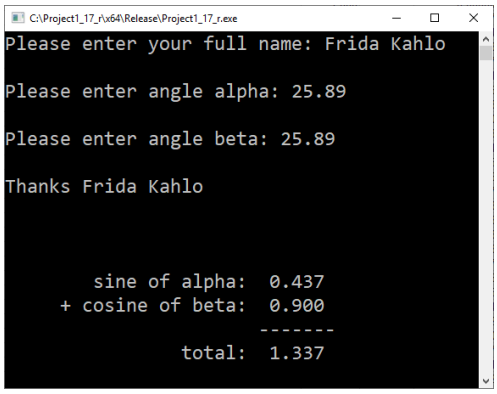
Important: more points may be lost for other reasons not specified here.

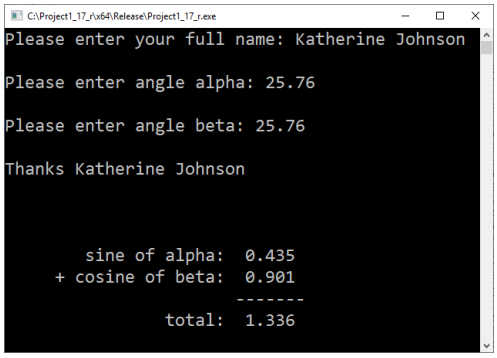
The following are sample runs of the program.








C:\Project1_17_r\x64\Release\Project1_17_r.exe
Please enter your full name: Frida Kahlo
Please enter angle alpha: 25.89
Please enter angle beta: 25.89
Thanks Frida Kahlo
sine of alpha: 0.437
+ cosine of beta: 0.900
total: 1.337


C:\Project1_17_r\x64\Release\Project1_17_r.exe
Please enter your full name: Katherine Johnson
Please enter angle alpha: 25.76
Please enter angle beta: 25.76
Thanks Katherine Johnson
sine of alpha: 0.435
+ cosine of beta: 0.901
total: 1.336