

Lab 3 – assigned Sunday Sept. 21, due Saturday Oct. 4 at 11:59 pm - this lab is to be submitted via UB Learns.

This is a submitted, graded lab. There are no late labs accepted for any reason. Please start early. You can submit as many times as you want (we only grade the last one). If you attempt to submit after the due date, UB Learns won't accept it, and you will unavoidably receive a zero on the lab and we will all feel terrible. Further, it is expected that you will submit compile-able, working, tested code. Anything less will receive a zero. If your code doesn't compile, we have nothing to grade.

The function of this lab is to understand variable declaration, cout/cin, if statements, and using some advanced math.

Build a calculator program to perform the following functions (to help you a little, the C++ code to print the user screen is included here):

```
#include <iostream>
#include <math.h>
using namespace std;
int main()
{
int userChoice = 0;
double x = 0.0;
double y = 0.0;
double ans = 0.0;
while ( /**** put an appropriate condition here ****/ )
{
cout << " _____ " << endl;
cout << "| " << endl;
cout << "| 1 - Print Personal Info |" << endl;
cout << "| 2 - Restaurant 15% Tip Calculator |" << endl;
cout << "| 3 - NYS 8% Sales Tax Calculator |" << endl;
cout << "| 4 - Kilometer per Hr to MPH |" << endl;
cout << "| 5 - MPH to Kilometer per Hr |" << endl;
cout << "| 6 - Fahrenheit to Centigrade |" << endl;
cout << "| 7 - Centigrade to Fahrenheit |" << endl;
cout << "| 8 - Angle/Trig characteristics |" << endl;
cout << "| " << endl;
cout << "| 0 - Exit |" << endl;
cout << "| _____ |" << endl;
cout << "Enter a selection, please: " << endl;
cin >> userChoice;

if (userChoice == 0)
{
cout << "Exiting..." << endl;
return 0;
}
else if ( userChoice == 1 )
```

```
// your program here

} // end while
} // end main
```

Your calculator must:

1. Print the above menu (*or one of your own design*) and ask the user to select an operation (choices 1 thru 8, and 0 to exit). DO NOT change the meaning of input codes (that is: 1 means Personal Info, etc.)
2. Based on the user selection (except for choices 1 and 0) , **your program must then ask for operands (sometimes one, sometimes two)**. The operands and the answers will be **doubles**. userChoice is an **int**.
3. Perform the required operation and store the result inside a variable
4. Print the answer. Your output should look user-friendly:

e.g. 32 degrees Fahrenheit equals 0 degrees Centigrade

Hint: that code may look like this:

```
cout << x << " degrees Fahrenheit equals " << ans << " degrees Centigrade" << endl;
```

5. Option #1 print your UBITName, student number, name, and preferred email address. Format it to look nice.
6. Option #8 - enter an angle (no limit on degrees, can be greater than 360), convert to radians, and output:

radians, Sin value, Cos value, Tangent value

The “#include <math.h>” library at the top of your program gives you access to a library of math functions (find them here <http://www.cplusplus.com/reference/cmath/>):

```
ans = pow(x,y); // x raised to the y power
ans = sqrt(x); // square root of x
ans = sin(x); // x, y, and ans are doubles
ans = cos(x);
```

The trig functions sin, cos, tan require the angle to be a double in radians, and return double values. Also, by including the math.h library, the pre-defined variable **M_PI** contains the value of Pi.

```
e.g. cout.precision(12);
      cout << M_PI << endl;
```

will display Pi as 3.14159265359

7. Required commenting:

Use the annotation paragraph format of

```
/*
```

this is a paragraph comment

*/

before your program to express your understanding of the problem and your general idea of the design (this shows that you understand the problem),

Use the annotation single line format of

// this is a single line comment

to explain your code where appropriate and especially at closing brackets (this shows that whether you truly understand the usage of the programming language).

8. Submit your cpp file via UB Learns