EE 1301
Lab 1: Basic C++

Warm-Up
(1) There are about 65 students in this class and about 16 in each lab section. Write a program that takes these values as inputs and finds the lecture to lab student ratio. (Since we are **counting** students, these should be of type `int`.)

Stretch
(1) A basic definition of the derivative is:

$$f'(x) = (\ f(x+h) - f(x)\ )/\ h$$

Write a program that uses this definition to compute the derivative of $f(x) = x^3 = x*x*x$ at x=20 with h=10^{-14}. (i.e. `int x=20; double h = 1e-14;`)

Compare this with the real derivative ($f'(x) = 3x^2$, so $f'(20) = 1200$) and explain to the TA why the computer does not return 1200. (You can play around with the value of "h" if you want to see different results.)

(2) Download kittyCode.cpp on the class website. When you run the program you should be able to enter a number. The program is **supposed** to convert from Fahrenheit to Celsius. Fix the code to do the conversion correctly. Before trying to fix the errors in the code, delete unnecessary comments and format the code using typical structure and indentation rules (rather than formatting the code in the shape of a cat!).

(3) King Arthur is out questing and needs to cross the bridge of death (see: https://www.youtube.com/watch?v=cV0tCphFMr8 for the context). The bridge keeper is currently on safari in Africa researching African swallows and has asked you to write a program to determine who may cross and who should be cast into the gorge of eternal peril. Your program should ask three questions and only report that someone may cross the bridge if all three questions are answered correctly. (**Hint**: you might want to consider using "if" statements in your code.) (**More fun**: if you want to randomize a question, you might want to copy code from numberGuessing.cpp on Moodle.)

Workout
(1) Start your main function with the following variable declaration (and initialization):
```
int x = 5;
```

Write code that computes and displays (using `cout`) the value of 5! (i.e., 120). You may not use any constants other than the one in the line above (e.g., you cannot directly use "4" anywhere). (**Hint:** you may need more than one variable).

Challenge
(1) Write a program that asks for the following values (in the following order):
Partner 1's full name
Partner 1's height (approximate)
Partner 2's full name (or an imaginary friend)
Partner 2's height

Output
Your code should output both partners' names and their combined height (if one stood on top of the other's head)

(2) Write a program that asks for a person's full name in the format: [first] [(middle)] [last] (Middle name is optional.)

Output
Display the name in a new format: [last], [first] [(middle)]

Example #1 (bold is what user types)
What is your full name?
John Jacob Jingleheimerschmitz
Jingleheimerschmitz, John Jacob

Example #2 (bold is what user types)
What is your full name?
John Sartori
Sartori, John

Demo
When you have written and tested all the programs, the TA will ask you to demonstrate one or more of the programs. You will also be asked to demonstrate that you can use gdb to set breakpoints, step through your code, print variables, etc., so make sure you know how to use gdb.