LAB #6 – Understand Exam 1 and Recursion

Understand Exam 1:
As part of this lab, you are to pair with someone else in the lab, and make sure you both understand EVERY part of Exam 1!!! This means that you need to go through each question, and convince each other that you understand WHY the right answer is the right answer. This means that you may need to write small programs to test the code in the exam or the code you needed to write for the extra credit. Here is the exam, in case you don’t have a copy: CS161-Exam1.pdf

For example, if you are not sure if C++ is case sensitive, which is #2, then declare these three variables, i.e. Alpha, ALPHA, and AlphA, assign each a different value, and print the contents.

Also, if you are still not sure how C++ handles arithmetic operators between floats and integers, as in #21-22, then you want to have:

```cpp
cout << 20.0 * (9/5) + 32.0;
cout << 20.0 * (9.0/5) + 32.0;
```

Your lab TA will pick 5 random questions from the test to ask you and your partner to explain to show your understanding and receive half your lab credit!!!

Practice Recursion:
After you finish solidifying your understanding of the class material from Chap. 1-4.1, then you will practice writing and timing recursive functions. You are provided the timing code in Assignment #4, and you will use this code to time your iterative versus recursive solution to the following problem.

In statistics, the formula for computing the number of ways of choosing \( r \) different things from a set of \( n \) things is the following:

\[
C(n, r) = \frac{n!}{(r! \cdot (n-r)!)}
\]

We already defined the factorial function as:

\[n! = n \cdot (n-1) \cdot (n-2) \cdot … \cdot 1\]

Write an iterative and recursive version of the formula for \( C(n, r) \), and write an iterative and recursive function that computes the value of the formula. Time each of these solutions for \( r=3, n=20 \) and \( r=10, n=2000 \).

What do you notice about the times for these two different solutions? What do you notice about the output/calculation for the two different inputs of \( r \) and \( n \)? What happens in the different solutions if \( n \) is 400000? Why?

Discuss your answers to these questions with the lab TA for full lab credit.