CS 211 Spring 2021 – Data Structures
Lab for Week #04

For this lab exercise, you will work in 2-person teams (a single 3-person team will be allowed is there are an odd total number of students in the lab). The point here is to have teams discuss the lab and offer each other support in making sure the IDE of your choice is working!

For this lab, one student will be the "driver" (the team member sharing the screen with the IDE) and the other student the "navigator" (the team member who is viewing the editing being done and collaborating in performing the Lab Exercises). **Each student will use the IDE of their choice** to compile and test the C++ code to ensure the IDE is up to performing the functions necessary to complete labs and assignments.

Lab Exercise

This lab is to review the principles of recursion, and to practice writing and using inductively-structured recursive functions. **NOTE: USE THE main.cpp and Lab04.h FILES SUPPLIED IN THE ASSIGNMENT PAGE TO TEST THESE!**

- Down the supplied **main.cpp** and **Lab04.h** files so that you can use to test your functions.
- Write all code in a single CPP file named **Lab04.cpp**. Make sure your function headers match the ones in the **Lab04.h** file!
- Define and test a function **sumDownBy2(unsigned int n)** that **uses recursion** (not a loop!) and returns the sum of positive integers **n**, (**n-2**), (**n-4**), etc., down to zero or one, whichever is appropriate.
- Define and test a function **recursiveMult(unsigned int j, unsigned int k)** that **uses recursion** (not a loop!) and returns the product of **j** and **k** **without using the multiplication operator** but instead makes use of only addition and recursive calls.
- Define test a function **geometricSum(unsigned int n)** that uses recursion to calculate and returns the value of $1 + ½ + ¼ + ... + (½)^n$. Note that this sum can be expressed as $\sum_{i=0}^{n} (\frac{1}{2})^i$

  Do not use an exponent operation – instead make use of only addition and division and recursive calls. (HINT: If what you have is the value of the sum from 0 to n-1, you can calculate the sum from 0 to n with a single division and a single addition. Add the new term to the beginning of the series, not the end!)
- At the top of your team's **Lab04.cpp** file, include these lines based on your 2-person team:

```
# CS 211 Spring 2021 – Week 04 Lab
# <Student_Name1> and <Student_Name2>
```

ONCE FINISHED, ALL STUDENTS SHOULD SUBMIT ALL THE FILES VIA CANVAS.
You should send your CPP file to all team members for submission.
Submit the Lab04.cpp file via Canvas.
Do NOT submit the main.cpp or Lab04.h files – the instructor already has those!