

## CPS212 - COMPUTATIONAL STRUCTURES AND ALGORITHMS

**Lab 1** Due: Wednesday, January 22, at the start of class

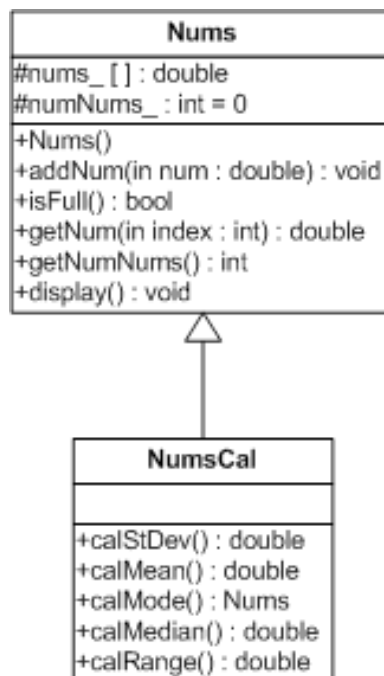
Submission process – see the document entitled “CPS212 Lab/Project Submission Policy” for details.

**Objective:** To introduce you to working with C++ by developing a complete working application.

### Introduction

In this first lab, each programming team will create two classes “Nums” and “NumsCal”. The class “Nums” stores a list of numbers in an array called “nums\_” and has supporting operations: addNum, isFull, getNum, getNumNums, and display. A second class “NumsCal” is derived from the class “Nums” therefore it is also a list of numbers class. However, it also has several new operations calStDev, calMean, calMedian, calRange, calMode which allow several basic calculations (mean, median, mode, range, and standard deviation) to be performed on the list of numbers. For a detailed description of these calculations see: “<http://www.ltcconline.net/greenl/courses/201/descstat/mean.htm>”

### UML Class Diagram



Resources:

- `/gc/cs212/lab1_2009/nums`
- <http://www.cplusplus.com/doc/tutorial/>
- <http://www.ltcconline.net/green/courses/201/descstat/mean.htm>

**IMPORTANT: You are expected to use appropriate whitespace and commenting - including file, class, and method prologue comments - in all the code you turn in. This will not be stated explicitly in future labs, but is always required!**

## Requirements for this Lab Session

### Preliminary Directions

- In this and subsequent labs, you will be doing your work using an IDE called *Eclipse* on one of our machines in the Mac Lab. You will also use a similar process for your projects. This IDE is available on all platforms – see [www.eclipse.org](http://www.eclipse.org)
- Log in to the Mac using the cps212 account with the password “privateclass”.
- Connect to your server share on Moses and connect to the cps212Drop share (in order to turn in your lab files)
- Test drive the program prototype by:
  1. open a terminal window
  2. open a secure shell (ssh) into Moses by typing:

```
ssh first.last@moses.cs.gordon.edu  
password: type in your password
```

3. execute the program by typing:  
`/gc/cs212/lab1_2009/nums`

### Example execution:

```
First.last@moses:~> /gc/cs212/lab1_2009/nums  
Enter a series of numbers (-1 to exit): 30 40 50 60 70 80 -1  
Number List: 30 - 40 - 50 - 60 - 70 - 80  
Mode List: 30 - 40 - 50 - 60 - 70 - 80  
Mean: 55  
Median: 55  
Range: 50  
Standard Deviation: 18.7083
```

## Detailed Directions

- Create a workspace (folder) for Eclipse...this can be done on the desktop or it can be done on a flashdrive. If the workspace is created on the desktop, you'll have to remember to move it over to your Moses file share after you are done working on it. (Also, you'll have to remember to delete it off the desktop.)

*This is a one time creation – it will be used throughout the semester as the location for Eclipse projects.*

- Follow the procedure given in class to create a new project called “###\_LAB1” or “###\_###\_LAB1” using Eclipse. Note: ### is the initials of the author or ###\_### are the initials of the authors. For example: jrs\_LAB1 would be the project for Job Robert Smith.
- Follow the example given in class:
  1. Create the two class definitions within the header file, “lab1.h”
  2. Create the implementation of the classes within the file, “lab1.cpp”
  3. Create the needed driver code within the file, “main.cpp”
- Eclipse Development Details:
  1. Execute Eclipse
  2. Select your workspace and make sure Eclipse is in the “C/C++ perspective”
  3. To create new project - File>>New>>C++ project
  4. To compile project files - Project >>Build Project
  5. To open various views (like console) – Window>>Show View
  6. To execute (run) your program – Run>>run

Note: Most (if not all) of these actions can also be carried out through tool bar icons.

## Coding Specifics

- For this lab, you will be using a static array to hold the list of numbers.
- Use a define directive at the top of your header file for the maximum number of element in your array.
- Use any particular sort routine (you'll need to sort the list for couple of the calculations). You are allowed to copy a sort routine from the text or internet. Do not sort the original number list – make a copy of the number list and then sort it.
- Note: calMode will return “Nums”.

## Finishing things up

- Create a text document entitled “readme” which answers a couple of questions:
  1. What were some of the more frustrating or challenging aspects of this lab?
  2. What are some of the more striking differences between Java and C++?
  3. What answers did your final program give for the following list of numbers?

1 2 3 4 3 2 4 5 6 7 8 2 3 4 5

20.3 40.5 60.7 20.3 40.5 10.2 30.5 60.7

- Place the above document into your new project folder
- drag a copy of your project folder to cps212Drop.

Before leaving: exit Eclipse, move the workspace folder to your share (remove it from the macintosh), and log off .

**DROP A COPY OF THE PROJECT INTO THE CPS212DROP LOCATION.**