**Homework Assignment #1**

**Due: Sunday Jan 24th, at 11:59 PM.**

The objective of this assignment is to get you started on techniques for development of basic algorithms and see them through implementation.

This week’s focus is on matrix operations (addition, subtraction, multiplications.) Also, you will need to practice the use of random number generators to create data on the fly.

You are to write programs to do matrix operations of two dimensional matrices of n rows and m columns. Your program must work for any size. The n and m must be input through the command console in real-time.

1. Your program must first create two matrices A and B each of size (n)x(m). The elements of the matrix must be generated randomly. Each generated matrix element is an integer in the range of [x,y] inclusive; x and y (x<=y) are integers and must be entered through the command line in real-time.
2. Perform matrix addition on A + B and save the result in matrix C; make sure the dimensions match before you do the addition.
3. Perform matrix subtraction on A - B and save the result in matrix D; make sure the dimensions match before you do the subtraction.
4. Perform matrix multiplication on A \* B and save the result in matrix C. Make sure the dimensions match before you do the addition, otherwise, issue an error and terminate the program.
5. Empirically, calculate the total the number of operations performed by each of the programs you implemented above, these are (+,-,\*). Do this for sizes of 16, 32, 64, 128, and 256 assuming n=m.
6. Dervice a general formulae for the total number of operations in your programs.

The grading procedure will involve submitting a working program on BB. The code must be written in Java. Also, be prepared for a detailed live demo to your assigned TA. Please be prepared to answer questions about every aspect of your code and results.