CS-182
Lab #5
Matrices

Date: Wednesday, January 17th, 2001
Due: Thursday, January 25th, 2001

The purpose of this assignment is to solve both matrix addition and matrix multiplication problems (with nested loops). A matrix is a two dimensional array (use vectors). A matrix sum is simply the two dimensional array that results from adding M1[i, j] to M2[i, j] for i = 0 to #rows-1, and j = 0 to #cols-1. If two matrices are not the same size, they are non-conformable and can **not** be added. Matrix Multiplication is a little more difficult. First, the two matrices to be multiplied must be conformable. A product matrix element P[i, j] is formed by summing the products of M1[i, k] and M2[k, j] for k = 0 to #cols-1 in M1 (or k = 0 to #rows-1 in M2). This repeats for all i from 0 to #rows-1 in M1, and for all j from 0 to #cols-1 in M2. Thus, M1 is conformable with M2 iff (if and only if) #cols in M1 = #rows in M2. An example of this will be given in class.

Matrix addition and multiplication should be implemented as separate functions in your program. Name the addition routine matrixSum and the multiplication routine matrixProduct. These routines will need to be passed the two matrix operands as input parameters, along with the dimensions of the matrices. The resultant matrix will need to be passed back to the calling program as an output parameter. Since these subroutines will be unsure of the exact size of the array arguments passed to them, you must use constant references to the input matrices and then pass the row and column sizes as arguments along with the arrays. The function can return a new instance of a matrix to hold the result of the add or multiply operation.

Make sure your program:
- Makes use of at least 3 functions (main, matrixSum, and matrixProduct).
- Tests if the matrices are conformable.
- Formats the output nicely, with headings for the resultant matrices.
- Uses an array initialization list to initialize arrays.

Your input data will be as follows:

Matrix W	Matrix X	Matrix Y
========	========	========
40 34 74 -35	-71 56 27	-30 50 21
-49 -11 8 -62	-12 -24 -19	18 -44 78
86 89 43 -30	33 -77 -46	-58 -30 69
	-85 -85 -58	

Compute the following sums:
W + W
X + X
Y + Y

Compute the following products:
W * X
X * W
X * Y
Y * X