

ECE 2220: System Programming Concepts
Problem Set 4

Fall 2016
Due: in class, Friday, October 7

Assigned reading: Hoover, Chapter 4.2.3 and 4.2.4 (pages 113-118). Each problem is worth 25 points

1. Write the code necessary to create a dynamically allocated two-dimensional matrix **m** of **2** rows and **3** columns, set the last element in the matrix to 5, and then free the memory

For the next three problems, download and compile the program **matrix_alg.c** from blackboard. The program implements code needed for problem 5 on page 129. Read the description of the program from page 129. Experiment with the code. For example, enter the first matrix as the following 1×3 matrix:

$$m_1 = [1 \quad 7 \quad 4]$$

And the second matrix as a 3×2 matrix

$$m_2 = \begin{bmatrix} 1 & 3 \\ 1 & 9 \\ 6 & 2 \end{bmatrix}$$

And show the product of the matrices is

$$m_r = [32 \quad 74]$$

We call this the result matrix.

If you have not seen matrix multiplication yet, see the illustration here:

http://en.wikipedia.org/wiki/Matrix_multiplication

Write three functions to add to the code to perform additional operations on the result matrix:

2. **Sum()**: Calculate and print the sum of all the entries in the result matrix
3. **Transpose()**: Create the transpose of the result matrix and print it (you need to malloc memory for the transpose of the result matrix). The function returns a pointer to the transposed matrix.
4. **Distribution()**: This function should take at least three arguments: the result matrix and two counters. Upon completion, the counters should hold the total numbers of positive and negative values in the matrix. The function should return the number of values equal to zero. Upon return of this function print the number of positive, negative, and zero entries in the result matrix.

Wikipedia has a nice graphical picture showing the definition of transpose:

<http://en.wikipedia.org/wiki/Transpose>

For this problem, you do not need to submit an electronic copy. Just print the new functions, and the output for a few trials that shows the results.

Turn in a paper copy of your solutions in class. Do not submit electronically. While we have a policy for late submission of programming assignments, late submission of homework assignments will not be accepted.