Student name: _____

Date:03/20/2014
Course: SWE 110 " C Programming"

Mid Term exam

Version 1

- The exam is 90 minutes (=1.5 hours).
- You are allowed to use any written material (in hard copy or on the computer), including the book, homework solutions, and lecture slides.
- You are **NOT** allowed to use Visual Studio or other coding environments to develop or test your answers.
- Please write clear programs: Either use comments, or make it clear otherwise.

There are 4 questions, roughly dealing with: Strings/Characters, 2D arrays, nested loops, and Arrays/Pointers.

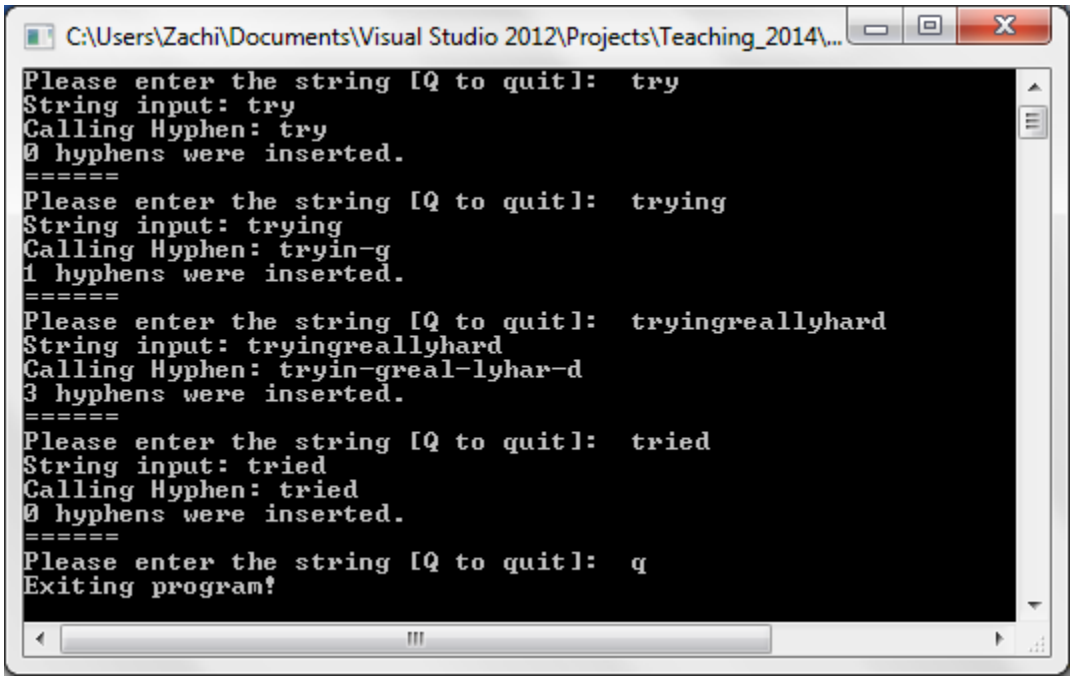
The valuation rubric (we showed the full one in class, so this is just a reminder) will include:

1. Follows specifications and constraints
2. Solution correctness
3. Applies previous knowledge (Math/Eng/Science) to current task
4. Efficiency
5. Delivery : On time and in proper form (documentation/comments)

Question 1 (25 points) : Strings

You will write a program to add a hyphen every 5 characters of a string.

0. Write a program that prompts the user for a string (assume not more than 80 characters).
1. Single character string 'Q' (or 'q') will terminate the program.
2. The main() program calls a function Hyphen(), that takes as an input a string, and prints the string hyphenated (see below 2.a), and returns the number of hyphens inserted.
    a. A hyphen is inserted in the string every 5 characters.
3. Print the string BEFORE and AFTER the function call, and print how many hyphens were inserted.
4. Go back to step 0.



Question 2 (25 points) : 2D Arrays

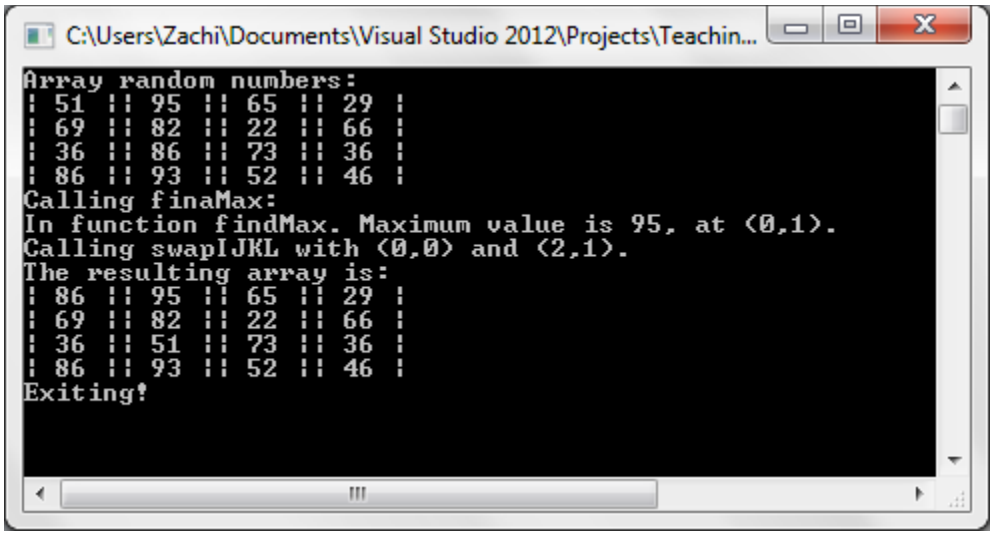
Write a main() program that declares a 2D array that can hold 4 rows x 4 cols of integers.

0. Fill the array with random numbers in the range 10 to 100.

Write the following 2 functions:

1. findMax() – The function takes as an input the 2D array, prints the maximum and its location, and returns the maximum value of the array. In case of a tie, it selects one of the occurrences.
2. swapIJKL() – The function takes as an input the 2D array, and four integers (i,j,k,l). The program then swaps the array values at locations (i,j) and (k,l). swapIJKL does not return any value.

You do NOT have to print the array the way it is described in the screenshots below. This is just for explanation purposes.



Question 3 (25 points) : Nested loops

Write a program that prompts the user for two input integers:
Rows and Cols.

Then, create the following patterns:

1. Running numbers: sequential number printing.

For example, assume Rows=3 and Cols=4:

```
 1  2   3   4
 5  6   7   8
 9 10  11  12
```

For example, assume Rows=2 and Cols=3:

```
1 2 3
4 5 6
```

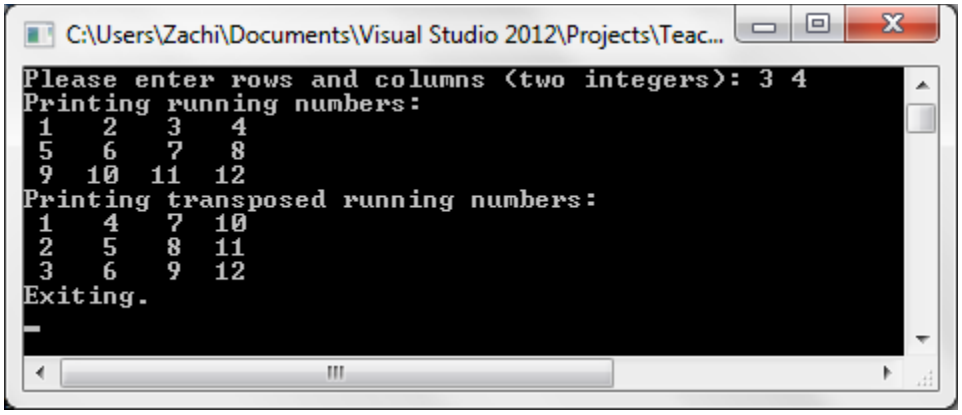
2. Transposed running numbers:

For example, assume Rows=3 and Cols=4:

```
 1  4   7  10
 2  5   8  11
 3  6   9  12
```

For example, assume Rows=2 and Cols=3:

```
1 3 5
2 4 6
```



Question 4 (25 points) : Arrays

Write a program that prompts the user for an integer, (-1) to end, and stores them in an array in an ordered way (from smallest to largest).
Assume no more than 20 numbers are going to be inserted.
The array should be printed after each user input.
HINT: Use a function insertItem(), that inserts the new input number in the right place in the array.