

Programming and Data Structures Laboratory, 2018-19 Spring semester, Section 6

March 19, 2019: Tutorial and Assignment 7 (Pointer arithmetic, Pointers, Arrays and Strings)

Tutorial

Declare (i) a 2-D array of integers `iarr[4][3]`, and (ii) a 2-D character array `carr[4][3]`. Print out the address of each element of each of the arrays. Understand how arrays are stored in the computer memory. How can the address of `iarr[i][j]` or `carr[i][j]` be obtained from the starting address of the array?

Assignment (for evaluation – write on machine and submit to Moodle before end of class)

1. [20 marks] Write a program that takes as input from the user, a NxN matrix of integers (which will be stored as a 2-d array). You can assume that N will be at most 10, hence you can declare the 2-d array accordingly. The main() function should take the elements of the matrix as input from the user, displaying suitable prompts, e.g.,

```
Enter the dimension of the matrix (N): 3
Enter the value of element [1][1]: -4
Enter the value of element [1][2]: 3
...
Enter the value of element [3][3]: 9
```

Write a function that takes this 2-d array as argument, and computes (i) the largest element in the main diagonal, and (ii) the smallest element in the secondary diagonal. The function should inform these two values to the main() function (using pointers), and the main() function should print them out.

2. [15 marks] Write a recursive function GCD() to compute the gcd of two integers by the Euclid's algorithm (refer to https://en.wikipedia.org/wiki/Euclidean_algorithm for a description). The return type of GCD() should be void. You decide the type(s) of the argument(s) that are passed to GCD(). Declare three integer variables a, b and isgcd in the main() function. Take from keyboard two positive integers and store them in variables a and b. Then call the function GCD(). After the call returns to the main, the variable isgcd should hold the gcd of a and b. Finally print the value of the variable isgcd on the screen. Your entire program should not contain any other variable declarations other than a,b and isgcd.

3. [15 marks] Take two strings s1 and s2 as inputs. Assume that s1 and s2 are sequences of English words. Combine s1 and s2 into a strings s of words as follows: Insert words alternately from s1 and s2 in s, starting with s1. If all the words of one of the strings s1 or s2 are inserted, copy the rest of the other string into s. Finally print s on the screen.

Example interaction with user:

```
Enter s1: It is raining outside
```

```
Enter s2: Ram has gone to market
```

```
It Ram is has raining gone outside to market
```

Submission instructions:

Submit one compressed file, named as **<roll number>_A7.tar.gz** or **<roll number>_A7.zip**

The compressed file should contain four source files:

<roll number>_A7_1.c, <roll number>_A7_2.c, <roll number>_A7_3.c