INTRO TO COMPUTER PROGRAMMING

LAB ASSIGNMENT – 10

NOTES:

1. Please carefully read all assignments and there is no choice.
2. Follow naming and style conventions.

PROBLEM INSTRUCTIONS:

For all problems (except 6th) write functions which satisfy the following:

1. The functions **should not have a return statement** (hence its return type should be void).
2. **All** the **arguments** to the functions should be **pointers**
3. Do **not use global or static** variables.

PROBLEMS:

1. Write a simple function to cycle('int') values stored in three variables. If a =1, b =2, c=3 then after cycle you get a=3, b=1, c=2.

2. Write a recursive function to compute factorial of a given number.

3. Write a function which takes in an empty array of size 30 and fills it with the first 30 values of the function T(n) = T(n-1) + T(n-3) for n > 2. Where T(0)=0, T(1)=1,T(2)=1.
    a. The function should only populate, you should print the result in main() after the function call.

4. In main, accept a string of 'n' characters (taken as input from the user) and write a function which takes as input
    a. a pointer to the string
    b. Reverses the list of characters in place (i.e same memory location)
    c. The function should only reverse, you should only print the result in main()

5. In main, use an array to store the integers (taken as input from user) and write a function which takes as input
    a. the pointer to the first memory location
    b. an integer pointer to store the sum (result-pointer)
    c. an integer pointer which contains the length of the array.

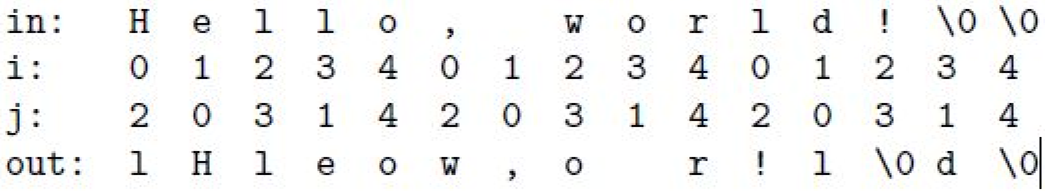
` The function should access the array elements using the pointer, compute sum and populate the appropriate memory location with the result.

6. For this assignment, you are to implement a simple transposition cipher. This cipher encrypts and decrypts a sequence of characters by dividing the sequence into blocks of size n, where n is specified by the encryption key. If the input text has a length that is not a multiple of n, the last block is padded with null characters ('\0'). In addition to n, the key also specifies two parameters a and b. For each block, the i-th output character, starting from 0 as usual, is set to the j-th input character, where

$$j = (ai + b) \; mod \; n.$$

For appropriate choices of a and b, this will reorder the characters in the block in a way that can be reversed by choosing a corresponding decryption key (n, a, b).

For example, if n = 5, a = 3, and b = 2, the string Hello, world! would be encrypted like this:



```
in:   H  e  l  l  o  ,     w  o  r  l  d  !  \0 \0
i:    0  1  2  3  4  0  1  2  3  4  0  1  2  3  4
j:    2  0  3  1  4  2  0  3  1  4  2  0  3  1  4
out:  l  H  l  e  o  w  ,  o     r  !  l  \0 d  \0
```