

## COL100 Assignment, Week 11

In the following questions, you must come up with a recursive formulation of the given problem, and then implement a solution in C using recursion. The recursive formulation for the first question is given as an example. The details of the implementation, such as how to take input from the user, the maximum size of the input etc., are left to your discretion.

1. Find the largest number in a given integer array using recursion.

Recursive formulation: Let us use the shorthand notation  $A[i:n]$  to denote the set of elements  $\{A[i], A[i+1], \dots, A[n]\}$  of array A. Then

$$\begin{aligned}\text{Max } A[0,k] &= \text{Max } \{A[k], A[0:k-1]\}; & \text{if } k > 0 \\ &= A[0]; & \text{if } k = 0\end{aligned}$$

2. Find the sum of numbers in a given integer array.
3. Find the sum of digits of an integer using recursion.  
Example: if the input number is 5981, then the recursive function should output 23.
4. Check if a given string is a Palindrome or not using recursion. To simplify matters, you can give the length of the string as one of the inputs to the recursive function.
5. Convert a given integer variable (given in decimal format) into another int (in binary equivalent) using recursion. For example, if the recursive function is given integer 43 as input, then it should return another integer 101011, which is the binary representation of 43.
6. Find  $d^N$  where d is a float, and N a positive int, using recursion. Your implementation should use at most  $\log_2 N + 1$  recursive function calls.