**Total Problems: Seven**

* **You have to solve all the problems using recursion.**
* **Please note that you are not allowed to use any global variables.**
* **You are not allowed to use loop to solve the problems.**

**Problem A**

In this problem, you just need to count the number of vowels contain in an input string.

**Input**

Input file contains a single line of string.

1<Length of a String<200

**Output**

Print the number of vowels contains in the input string.

|  |  |
| --- | --- |
| Data Structure Lab | 6 |

**Problem B**

In this problem, you need to find the maximum of all the digits of an integer number using recursion.

**Input**

The first line of input contains an integer, T, which denotes the number of input you have to handle. Each of the next T lines contains an integer N (0<=N<10000000).

**Output**

For each input number you have to print the max of the digits in that number.

|  |  |
| --- | --- |
| 3  121  39  123456 | 2  9  6 |

**Problem C**

In this problem, you need to convert a binary number into decimal using recursion.

**Input**

Input contains a string with 0s and 1s. The length of the string will be at most 63. The string represents a valid binary number.

**Output**

Output the corresponding decimal number.

|  |  |
| --- | --- |
| 10 | 2 |
| 101 | 5 |
| 11111 | 31 |

**Problem D**

Given integers A and B, print the value of GCD(A, B). GCD is greatest common divisor using recursion.

**Input**

Input will consist of two integers, A and B (-109 <= A, B <= 109) in one line. It will never be two zeroes.

**Output**

Output will consist of 1 line: Value of gcd.

|  |  |
| --- | --- |
| **Sample Input** | **Sample Output** |
| 12 18 | 6 |
| 6 3 | 3 |

**Problem E**

In this problem, you will have to check whether an input number is prime using recursion.

**Input**

The first line of input contains an integer, T, which denotes the number of input you have to handle. Each of the next T lines contains an integer N. 1<=N<=10000000

**Output**

For each input number you have print “**Prime”**, if the input number is a prime number. Otherwise print **“Not Prime”**

|  |  |
| --- | --- |
| 5  121  39  7  19  33 | Not Prime  Not Prime  Prime  Prime  Not Prime |

**Problem F**

You have to reverse a string and print that reversed string using recursion. Please note that you must store the reversed array.

**Input**

Input file contains a single line of string. 1<=Length of a String<200

**Output**

Print the reverse of the input string.

|  |  |
| --- | --- |
| Hello World | dlroW olleH |

**Problem G**

Given an integer N, print all the Derrangements of 1 to N. A permutation of 1 to N is called a Derrangement, if none of the numbers is in its original position. You have to use recursion.

**Input**

Input will consist of an integer, N (2 <= N <= 8) in one line.

**Output**

Output will consist of several lines, each line with a new derrangement in lexicographic order.

|  |  |
| --- | --- |
| **Sample Input** | **Output of Sample Input** |
| 3 | 2 3 1  3 1 2 |
| 2 | 2 1 |
| 4 | 2 1 4 3  2 3 4 1  2 4 1 3  3 1 4 2  3 4 1 2  3 4 2 1  4 1 2 3  4 3 1 2  4 3 2 1 |