Hacktoberfest 2021 Challenges:

Participants are required to provide solutions and dry run/time/space analysis for their suggested solution to the following mentioned problems:

1. Quick Sort

Sort an array A using Quick Sort.

Change in the input array itself. So no need to return or print anything.

Input format :

Line 1 : Integer n i.e. Array size
Line 2 : Array elements (separated by space)

Output format :

Array elements in increasing order (separated by space)

Constraints :

1 <= n <= 10^3

2. Tower of Hanoi

Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move all disks from source rod to destination rod using third rod (say auxiliary). The rules are :

1) Only one disk can be moved at a time.
2) A disk can be moved only if it is on the top of a rod.
3) No disk can be placed on the top of a smaller disk.

Print the steps required to move n disks from source rod to destination rod.

Source Rod is named as 'a', auxiliary rod as 'b' and destination rod as 'c'.

Input Format :

Integer n

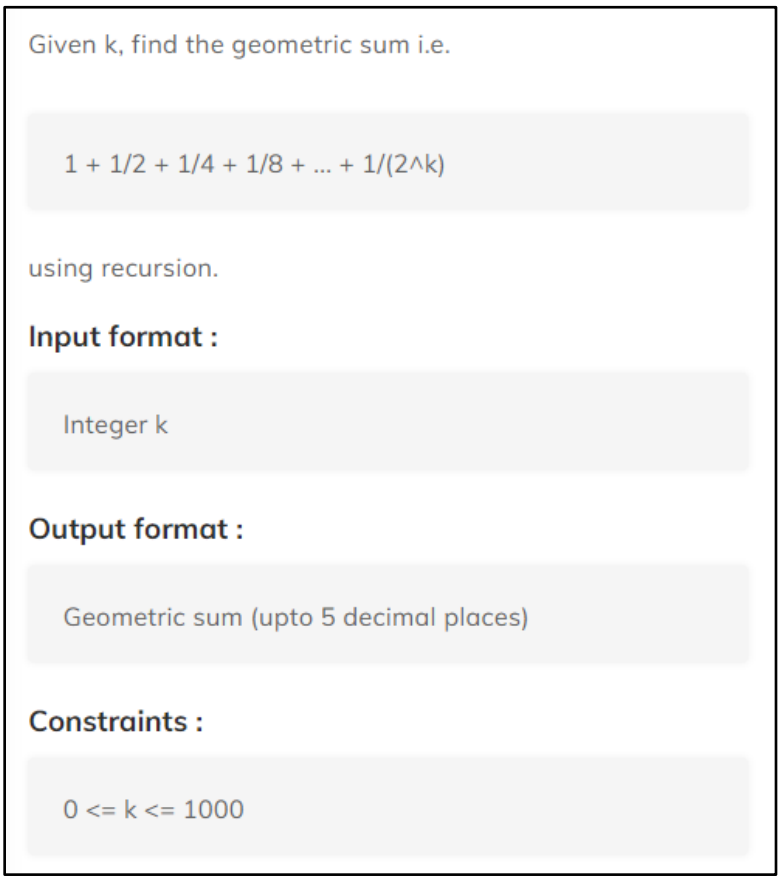
Output Format :

Steps in different lines (in one line print source and destination rod name separated by space)

Constraints :

0 <= n <= 20

3. Geometric Sum



Given k, find the geometric sum i.e.

1 + 1/2 + 1/4 + 1/8 + ... + 1/(2^k)

using recursion.

Input format :

Integer k

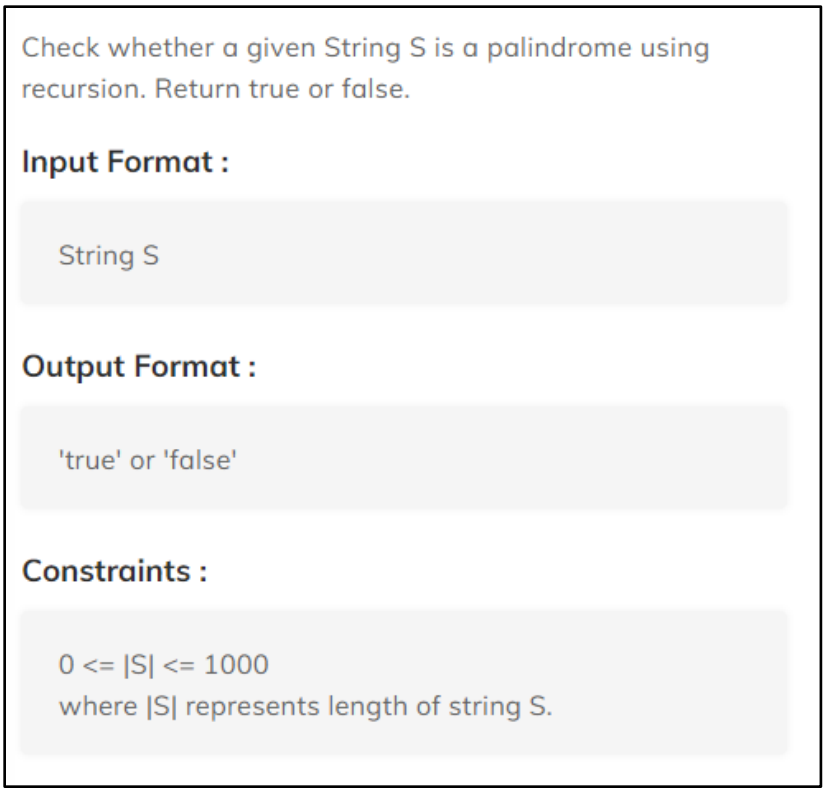
Output format :

Geometric sum (upto 5 decimal places)

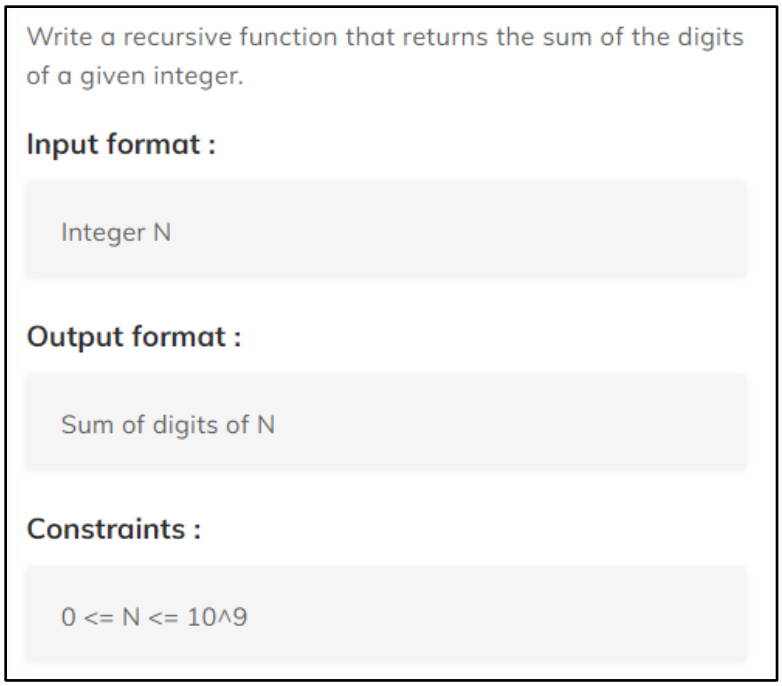
Constraints :

0 <= k <= 1000

4. Check Palindrome (Recursive)



5. Sum of Digits



6. Multiplication (Recursive)

Given two integers M & N, calculate and return their multiplication using recursion. You can only use subtraction and addition for your calculation. No other operators are allowed.

Input format :

Line 1 : Integer M
Line 2 : Integer N

Output format :

M x N

Constraints :

0 <= M <= 1000
0 <= N <= 1000

7. Count Zeros

Given an integer N, count and return the number of zeros that are present in the given integer using recursion.

Input Format :

Integer N

Output Format :

Number of zeros in N

Constraints :

0 <= N <= 10^9

8. String to Integer

Write a recursive function to convert a given string into the number it represents. That is input will be a numeric string that contains only numbers, you need to convert the string into corresponding integer and return the answer.

Input format :

Numeric string S (string, Eg. "1234")

Output format :

Corresponding integer N (int, Eg. 1234)

Constraints :

0 <= |S| <= 9
where |S| represents length of string S.

9. Pair Star

Given a string S, compute recursively a new string where identical chars that are adjacent in the original string are separated from each other by a "*".

Input format :

String S

Output format :

Modified string

Constraints :

0 <= |S| <= 1000
where |S| represents length of string S.

10. Check AB

Suppose you have a string, S, made up of only 'a's and 'b's. Write a recursive function that checks if the string was generated using the following rules:

a. The string begins with an 'a'
b. Each 'a' is followed by nothing or an 'a' or "bb"
c. Each "bb" is followed by nothing or an 'a'

If all the rules are followed by the given string, return true otherwise return false.

Input format :

String S

Output format :

'true' or 'false'

Constraints :

1 <= |S| <= 1000
where |S| represents length of string S.

11. Staircase

A child is running up a staircase with N steps, and can hop either 1 step, 2 steps or 3 steps at a time. Implement a method to count how many possible ways the child can run up to the stairs. You need to return number of possible ways W.

Input format :

Integer N

Output Format :

Integer W

Constraints :

1 <= N <= 30