

## Recursion Exercise 1

**Note: -**

- 1) Use GCC. On windows install mingW (minimal gcc compiler for windows) and set path variables. On ubuntu write on terminal "sudo apt-get install gcc" without quotes. Do not use turbo c compiler
- 2) This exercise is meant to do using recursion.
- 3) Do not discuss questions prior to solving them yourself.
- 4) Evaluate yourself easy questions 2 marks, intermediate questions 5 marks, advanced questions 10 marks.

[Read: <http://www.geeksforgeeks.org/recursion/>]

### **Q.1. Factorial**

Write a C program to find factorial of a number.

**Example:**

**Input:** 5

**Output:** 120

### **Q.2. Natural Sum**

Write a C program to find the sum of n natural numbers. Do not use direct formula, use recursion.

**Example:**

**Input:** 10

**Output:** 55

### **Q.3. Product**

Write a C program to find product of two numbers using recursion and only + and -.

**Example:**

**Input:** 23

**Output:** 6

### **Q.4. GCD(HCF)**

Write a C program to find the gcd of 2 numbers using recursion.

**Example:**

**Input:** 39 26

**Output:** 13

### **Q.5. "hi" Count**

Given a string, calculate recursively how many times lower case "hi" appears in the string.

### **Q.6. Reverse a String**

Write a recursive function to reverse a string.

### Q.7. Reverse string not Words

Write a recursive function to reverse the words in a string, i.e., "cat is running" becomes "running is cat".

### Q.8. Tower of Hanoi

Write a C program to print the steps for tower of Hanoi. Program will take input as number of disks, and 3 rods name as character.

Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

- 1) Only one disk can be moved at a time.
- 2) Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e., a disk can only be moved if it is the uppermost disk on a stack.
- 3) No disk may be placed on top of a smaller disk.

[READ: [https://en.wikipedia.org/wiki/Tower\\_of\\_Hanoi](https://en.wikipedia.org/wiki/Tower_of_Hanoi)]

#### Input:

4  
A  
B  
C

#### Output:

Move disk 1 from rod A to rod B  
Move disk 2 from rod A to rod C  
Move disk 1 from rod B to rod C  
Move disk 3 from rod A to rod B  
Move disk 1 from rod C to rod A  
Move disk 2 from rod C to rod B  
Move disk 1 from rod A to rod B  
Move disk 4 from rod A to rod C  
Move disk 1 from rod B to rod C  
Move disk 2 from rod B to rod A  
Move disk 1 from rod C to rod A  
Move disk 3 from rod B to rod C  
Move disk 1 from rod A to rod B  
Move disk 2 from rod A to rod C  
Move disk 1 from rod B to rod C

[**NOTE:** Total moves  $2n-1$  (where n is number of disks). This is the minimum number of moves that is needed to get the job done.]

### Q.9. Chocolate and wrapper

Given following three values, the task is to find the total number of maximum chocolates you can eat.

money: Amount of money you have, to buy chocolates.

price: Price of a chocolate.

wrap: Number of wrappers to be returned for getting one extra chocolate.

**Input Format:** The first line of input will take t (test cases) and the next t lines will take the money, price, and wrap for each test case.

**Output Format:** Print a single integer for each test case which denotes the total number of chocolates you can buy.

**Input:**

2

1622 1513

**Output:**

15 22

### Q.10. Palindrome Number

Write a C program to find if a number is palindrome or not. (Use recursion).

**Input Format:** First line of input takes a single integer t (number of test cases).

Next t lines will take single integers.