Problem: Series sum-1

Write a program that computes the sum of a series where each term except the first one is the square of the previous term. Take the number of terms N and the first term x as input. Both of the inputs will be integers. N is a non-negative integer and x is a real number. The general form of the series is given below.

$$x + x^2 + x^4 + \ldots..$$

Sample Input	Sample Output
10 1 3 2 4 2	10 22 278

Problem: Series sum-2

Write a program to compute the sum of the following series upto nth term using loop. The value of n will be given as input.

$$1 - 2/3 + 3/7 - 4/13...$$

Sample Input	Sample Output
2	0.333333
4	0.454212

Problem: Mode of sorted numbers

Write a program to determine and print the mode of a sorted sequence of numbers. The mode is the number or numbers that occur the maximum times in a sequence.

First, you will take the number of numbers in the sequence, N as input. Then, take as input N integers each of which is a member of the sequence. If more than one number that occur maximum amount of times, print the one that appears later in the sequence.

Note: The sequence will be in sorted order. You won't need array to solve this problem.

Sample Input	Sample Output
7 30 30 50 50 50 60 70	50
8 30 50 50 50 60 60 60 70	60

Problem: Count Distinct Numbers

Write a program to count the number of distinct integers from a sorted sequence of integers. **You cannot use any array to do this task.**

The first line of input will consist of a value n. In the next line, there will be n integers which are sorted in either ascending or descending order.

Sample Input	Sample Output
7 30 30 50 50 50 60 70	4
8 70 60 60 60 50 50 50 30	4

Problem: Armstrong Number

An Armstrong number is a number which is equal to the sum of digits raised to the power of total number of digits in the number. For example, an Armstrong number of three digits is an integer such that the sum of the cubes of its digits is equal to the number itself. 371 is an Armstrong number since 33 + 73 + 13 = 371.

Write a program to print the Armstrong numbers for n-digit numbers. The program takes an integer n as input. It outputs the Armstrong numbers, and also the total count for n-digit numbers. If there are no such numbers for n-digit numbers, print “None”.

Sample Input	Sample Output
2	None
3	153 370 371 407 Count = 4

Problem: Decimal to binary

Write a program that takes an integer decimal number (which will always be positive) as input and prints the binary equivalent of that number. Note that, you cannot use array/pointer to solve this problem.

Sample Input	Sample Output
1	1
6	110

Problem: Angle between vectors

In this problem, you will be given two n-dimensional vectors. You need to find the value of cosθ where the angle between the vectors is θ. The value of cosθ can be determined using the following equation,

$$cos\theta = \frac{A.B}{|A||B|}$$

Here, A.B is the dot product of the two vectors A and B. And |B| denotes the value of the vector.First you will be given an integer n which indicates the dimension of the vector. Then there will be 2*n integers. The first n integers correspond to the coefficients of unit vector along each axis of the first vector. Similarly the second n integers are for the second vector.Print the value of cosθ between these two vectors.

Sample Input	**Sample Output**
3 10 20 30 -10 -20 -30	-1
3 1 0 0 5 5 5	0.577350
6 1 0 0 0 0 0 0 1 0 0 0 0	0

Problem: Pattern-1

Write a program that takes an integer decimal number n ($1 \leq n \leq 9$) as input and display the following pattern for n number of rows.

Sample Input	**Sample Output**
1	1
2	1 1 2 3
3	1 1 2 3 1 2 3 4 5

Problem: Same bits

Write a C program that takes two integer numbers as input and determines the number of positions where both numbers contain same bits in their binary representation. Consider the rightmost position of two binary representations as the 1st position. For example, the binary representation of the numbers 11 and 7 are 1011 and 111 respectively. So, there are two positions where the bits are same. So, the answer is 2.

Sample Input	Sample Output
5 10	0
2 15	1
7 5	2

Problem: Series sum-3

In this problem, your input is a real number x. You need to apply Maclaurin series expansion to compute the value of e^{-x}.Use the first 10 terms from the infinite series. Print 6 digits after the decimal point in your output. Recall that, the expansion is as follows:

$$e^{-x} = \sum_{0}^{\infty} (-1)^n \frac{x^n}{n!}$$

Sample Input	Sample Output
1	0.367879
2	0.135335
7	0.049787

Problem: Common factors

Write a program that takes as input two integers and prints the number of common factor between those two integers. Note: The factors of 20 are 1, 2, 4, 5, 10, 20. And the factors of 12 are 1, 2, 3, 4, 6, 12. So the number of common factors of 12 and 20 is 3.

Sample Input	Sample Output
12 24	5
7 36	1
12 20	3

Problem: Number Triangle

Write a program that takes two integers x and n and prints the left aligned triangle according to the pattern shown in sample input output.

Sample Input	Sample Output
2 3	1 1 4 1 4 9

3 5	1 1 8 1 8 27 1 8 27 64 1 8 27 64 125

Problem: Series sum-4

Write a program that takes a non-negative integer and computes the sum of the following series up to n terms. **You cannot use nested loops for this problem.**

$$\frac{1}{1!} - \frac{1*(1+3)}{2!} + \frac{1*(1+3)*(1+3+5)}{3!} - \frac{1*(1+3)*(1+3+5)*(1+3+5+7)}{7!} + \cdots 0$$

Sample Input	**Sample Output**
1	1
2	-1
4	-19