APS Assignment 1:

(Deadline: Tuesday 20/8/13 5:00 PM)

1. Given a natural number n (1 <= n <= 500000), output the summation of all its proper divisors. A proper divisor of a natural number is the divisor that is strictly less than the number. For example 20 has 5 proper divisors: 1, 2, 4, 5, 10, and the divisor summation is: 1 + 2 + 4 + 5 + 10 = 22.

   Example:

   Input:
   20
   6
   8
   -1

   Output:
   22
   6
   7

2. Write a program to calculate the sum of digits of the expression 2^X where x is between 1 and 1000. The value of X is given as input. For example, $2^7=128$, sum of digits=1+2+8=11 .

   Example

   INPUT:
   7
   4
   -1

   OUTPUT:
   11
   7

3. Find the combination of two numbers C(N,M) (number of combinations of M chosen from the set N). For example, N=5, M=2, then C(N,M)=5 C 2 =10 . The input is format is: N<space>M. Value of N<=1000 . As the output can be large, print (output)mod (1000000007)

   INPUT:
   5 2
   6 2
   -1

   OUTPUT:
   10
   15

   Note: For the above three questions the input will have test cases <=100. The '-1' in the end will indicate the end of input.

4. Find the sum of all numbers between L and U (both inclusive) such that they are divisible by a or b.
As the output can be large,
print (output)mod (1000000007)

0<=L<U<=10^8
1<=a,b<=100

Input:

The First line of the input will contain **'T'** the number of test cases to be followed. The next T lines will contain 4 numbers each (**L<space>U<space>A<space>B**) where L is the lower bound and U is the upper bound. And A and B are the two numbers.

Output:

Display the sum of all numbers divisible by A or B between L & U. Output each answer on a saperate line.

Example:

Input:
2
0 10 2 5
10 20 3 5

output:
35
75

5. Kabeer has a diamond rod which is "n" meter long. He lost a bet with Pankaj so he is required to pay 1 meter of that rod to Pankaj everyday for "n" days. As cutting a rod is very difficult and Kabeer is very lazy, he wants to minimize his efforts for cutting the rod.

Kabeer realized that it was not necessary to cut exactly 1m rod everyday. For example, on the third day, he can give a 3 meter rod and can have 2 meter rod back which pankaj has already taken from him. Can you help your TA to minimize his efforts by telling the minimum cuts required so that he can pay from 1st to nth day to make his daily payment of 1m rod.
At the end of nth day he would have given the whole rod to Pankaj.

Input

Input would be a positive integer denoting the length of the rod(as well as no of days). 0 < n < 1000000. Terminate your program by a 0.

Output

For each "n" print the minimum number of cuts required so that Kabeer can fulfill his bet by paying 1 meter daily.

Example

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Input:
3
5
1
0
Output:
1
2
0
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