Introduction: The goal of this set of problems is completely educational. It aims at helping programmers improve their problem-solving skills. All the problems below can be classified as either easy or medium.

Problem A:

Sami finally hacked his university's site and got the password of the chef of the faculty of engineering. Being so proud, he wrote the password on a piece of paper and went to sleep. His little brother's eye fell upon that password and spoiled all the work.

First, he chose 2 random possibly empty strings s1 and s2. Designate by p the initial password. He shuffled the order of characters p and obtained a shuffled version of the password called p'. He then concatenated the three strings in the following order: s1 + p' + s2.

You are given the initial password p and a list of n strings. For each string, tell whether or not it can be formed by the concatenation described above.

Input: A string p with a length not exceeding 10000.

An integer T representing the number of testcases (T<100)

T lines follow, each containing a string whose length is at most 100000

Output: For each testcase, print "Yes" if the given string can be formed by the described concatenation, else print "No".

Sample input:

```
iloveme
3
abcdmeloiveccc
memeavdloveshsji
iovleemaabcilovem
```

Sample Output:

```
Yes
No
Yes
```

Problem B:

You've probably been taught the logical and operator: &.

Let us have some fun with this operator

You are given a 2-dimentional array of integers having n rows and m columns.

We denote by the BEAUTY of an array the following quantity.

Let f(i,j)= (maximum element in the ith row) & (maximum element in the jth column)

Let A be a 2-dimentional array, BEAUTY(A)=sum(f(i,j)) over all possible pairs of i and j.

Example: A={ {1,2,3},

{5,6,1} }

f(1,1)=(3&5)=1

f(1,2)=(3&6)=2

f(1,3)=(3&3)=3

f(2,1)=(6&5)=4

f(2,2)=(6&6)=6

f(2,3)=(6&3)=2

Thus BEAUTY(A)=1+2+3+4+6+2=18

As the result might be large, it's required to print the answer%(100).

The dimensions of the array don't exceed 100x100.

Sample Input: 2 3

1 2 3

5 6 1

Sample Output: 18

Problem C:

You are given an integer n not exceeding 10^9, you have to find two non-prime numbers a and b such that a-b=n and max(a,b)<10^10

Input format: An integer T representing the number of testcases (1<=t<=10^7)

T lines follow, each containing an integer n (1<=n<=10^9)

Output format: For each testcase, print the required integers a and b in order.

Problem D:

Yann is an ambitious guy. He is standing on the ground (level 0) in front of a mountain of height n. Yann's dream is to reach the top of the mountain so that he can see the world clearly. Yann climbs each day x meters upward. However, during night, Yann slides y meters down. Yann is worried whether it's possible to achieve his dream or not.

Input format: Three integers n,x and y , each one being inclusively between 1 and 10^9.

Output format: print the minimum number of days required for Yann to achieve his dream or say that it's impossible by printing a value of -1. (Yann achieves his dream when his level becomes at least n)

Sample input: 3 2 1

Sample output: 2

Sample input: 3 1 2

Sample output: -1

Problem E:

You are given an integer n, you have to tell the number of digits it's composed of.

N doesn't exceed 10^10000.

Sample input: 200

Sample output: 3

Problem F:

Vasya came to the store to buy goods for his friends for the New Year. It turned out that he was very lucky — today the offer "kk of goods for the price of one" is held in store.
Using this offer, Vasya can buy exactly k of any goods, paying only for the most expensive of them. Vasya decided to take this opportunity and buy as many goods as possible for his friends with the money he has.
More formally, for each good, its price is determined by ai — the number of coins it costs. Initially, Vasya has p coins. He wants to buy the maximum number of goods. Vasya can perform one of the following operations as many times as necessary:

- Vasya can buy one good with the index i if he currently has enough coins (i.e p≥ai). After buying this good, the number of Vasya's coins will decrease by aiai, (i.e it becomes p:=p−ai).
- Vasya can buy 2 goods and pay only the price of the more expensive good.

Please note that each good can be bought no more than once.
For example, if the store now has n=5 goods worth a1=2,a2=4,a3=3,a4=5,a5=7, respectively and Vasya has 6 coins, then he can buy 3 goods. A good with the index 1 will be bought by Vasya without using the offer and he will pay 2 coins. Goods with the indices 2 and 3 Vasya will buy using the offer and he will pay 4 coins. It can be proved that Vasya can not buy more goods with six coins.

Help Vasya to find out the maximum number of goods he can buy.

Input format:

The first line contains one integer t (1≤t≤10^4) — the number of test cases in the test.
The next lines contain a description of t test cases.
The first line of each test case contains 2 integers n,p (2≤n≤2x10^5,1≤p≤2x10^9) — the number of goods in the store and the number of coins Vasya has.
The second line of each test case contains n integers ai (1≤ai≤10^4) — the prices of goods.

It is guaranteed that the sum of n for all test cases does not exceed $2x10^5$.

Output format:

For each test case in a separate line print one integer m — the maximum number of goods that Vasya can buy.

Sample input:

6

5 6

2 4 3 5 7

5 11

2 4 3 5 7

2 10000

10000 10000

2 9999

10000 10000

5 13

8 2 8 2 5

3 18

1 2 3

Sample Output:

3

4

2

0

4

3

Problem G:

You are given a segment S joining 2 points in a 2D plane.

Determine the number of points having integer coordinates and belonging to S.

Input format: 4 integers x0,y0,x1,y1 representing the endpoints of the segment (x0,y0) and (x1,y1). All coordinates are between -10^9 and +10^9.

Output format: a single integer representing the required solution.

Sample input:1 1 1 1

Sample output: 1

Sample input: 1 2 3 6

Sample output: 3

Sample input: -1 -1 50 101

Sample output: 52

Sample input: -10000 1 1000000000 0
Sample output: 2

Advice: Use google and Bezout's theorem from Algebra 1 course.

Problem H:

You are given an integer n. Your friend asked you to calculate n! (the factorial of n).As you noticed that the result might be extremely large, your friend asked then that you calcite n! mod m where m=10^9+7.

Input format: an integer n inclusively between 1 and 10^6

Output format: a single integer representing the required result

Sample input: 5

Sample output: 120

Sample input: 1000000

Sample output: 283051545