P7. Smallest Sub-Array

(Time Limit: 8 seconds)

Consider an integer sequence consisting of N elements where

$$X1 = 1$$

$$X2 = 2$$

$$X3 = 3$$

$$Xi = (Xi-1 + Xi-2 + Xi-3)\%M + 1 \text{ for } i = 4 \text{ to } N$$

Find 2 values a and b so that the sequence (Xa Xa+1 Xa+2 . . . Xb−1Xb) contains all the integers from [1, K]. If there are multiple solutions then make sure (b − a) is as low as possible.

In other words, find the smallest subsequence from the given sequence that contains all the integers from 1 to K.

Consider an example where N = 20, M = 12 and K = 4.

The sequence is {1 2 3 7 1 12 9 11 9 6 3 7 5 4 5 3 1 10 3 3}.

The smallest subsequence that contains all the integers {1 2 3 4} has length 13 and is highlighted in the following sequence: {1 2 3 7 1 12 9 11 9 6 3 7 5 4 5 3 1 10 3 3}.

Input

First line of input is an integer T (T < 100) that represents the number of test cases. Each case consists of a line containing 3 integers N (2 < N < 1000001), M (0 < M < 1001) and K (1 < K < 101). The meaning of these variables is mentioned above.

Output

For each case, output the case number followed by the minimum length of the subsequence. If there is no valid subsequence, output 'sequence nai' instead. Look at the sample for exact format.

Sample Input

2

20 12 4

20 12 8

Sample Input

Case 1: 13

Case 2: sequence nai

P8. Sum of Different Primes

(Time Limit: 3 seconds)

A positive integer may be expressed as a sum of different prime numbers (primes), in one way or another. Given two positive integers n and k, you should count the number of ways to express n as a sum of k different primes. Here, two ways are considered to be the same if they sum up the same set of the primes. For example, 8 can be expressed as 3 + 5 and 5 + 3 but they are not distinguished.

When n and k are 24 and 3 respectively, the answer is two because there are two sets {2, 3, 19} and {2, 5, 17} whose sums are equal to 24. There are no other sets of three primes that sum up to 24. For n = 24 and k = 2, the answer is three, because there are three sets {5, 19}, {7, 17} and {11, 13}. For n = 2 and k = 1, the answer is one, because there is only one set {2} whose sum is 2. For n = 1 and k = 1, the answer is zero. As 1 is not a prime, you shouldn't count {1}. For n = 4 and k = 2, the answer is zero, because there are no sets of two different primes whose sums are 4.

Your job is to write a program that reports the number of such ways for the given n and k.

Input

The input is a sequence of datasets followed by a line containing two zeros separated by a space. A dataset is a line containing two positive integers n and k separated by a space. You may assume that $n \leq 1120$ and $k \leq 14$.

Output

The output should be composed of lines, each corresponding to an input dataset. An output line should contain one non-negative integer indicating the number of ways for n and k specified in the corresponding dataset. You may assume that it is less than 231.

Sample Input

```
24 3
24 2
2 1
1 1
4 2
18 3
17 1
17 3
17 4
100 5
1000 10
1120 14
0 0
```

Sample Output

```
2
3
1
0
0
2
1
0
1
55
200102899
2079324314
```