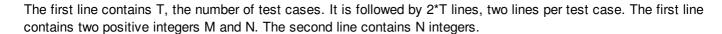
abdou set

<u>Abdou</u> has a set of unique positive integers. He wants to add several (possibly none) new positive integers to this set, such that when the set is sorted, for every two consecutive numbers X, Y abs(X%M-Y%M) = 1. Your task is to calculate the smallest possible count of new numbers, with which he can achieve that.

Input



1 <= T <= 5000 . 1 <= M <= 10^5

2 <= N <=50.

1 <= every integer in the set <= 10⁶

Output

For test case print a single integer in a separate line: the smallest possible count of new numbers, with which he can complete the set or -1 if no solution exists.

Example

Input:

5

23

2 10 20

102

10 20

10 6

11 19 5 30 40 100

12

1 9999

153

4218 15210 1426

Output:

2

1

-1

3

Explanation:

In the first test case we can add 3 and 13 to the given set to achieve abdou goal.