Problem 172: Counting-out Rhyme

Difficulty: Medium

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Problem Background

Everyone remembers from their childhood some variety of a "counting-out rhyme;" an often-nonsensical rhyme used to select or eliminate one person from a group. In the United States and United Kingdom, these rhymes commonly begin with "eeny, meenie, miney, moe;" a Polish version goes:

Hana, man, mona, mike;
Barcelona, bona, strike;
Hare, ware, frown, vanac;
Harrico, warico, we wo, wac!

As each word is spoken, the speaker points to one person in the group in turn. Upon reaching the end of the rhyme, whomever is being pointed at is eliminated from the group. The rhymer starts the rhyme again, pointing at the next person in line for the first word, and so on until only one person remains.

Problem Description

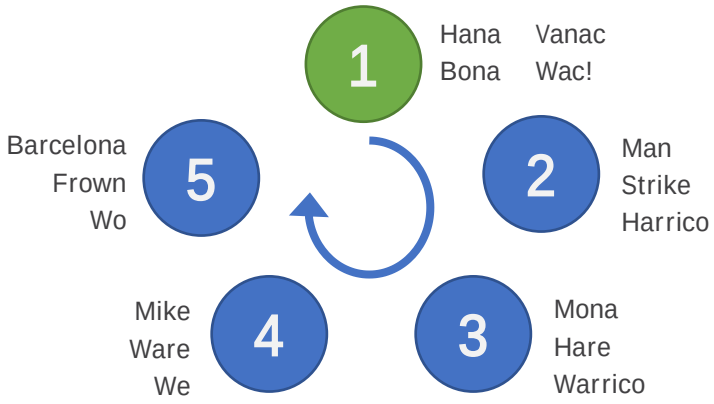
Everyone knows that the real trick in using these rhymes is knowing who to start with so you don't eliminate yourself. In the Polish rhyme above, there are sixteen separate words. If you're in a group of five people, each person can be given a unique number; naturally, you'll give yourself number 1. If you also start the rhyme with yourself...

1. Hana
2. Man
3. Mona
4. Mike

5. Barcelona
1. Bona
2. Strike
3. Hare

4. Ware
5. Frown
1. Vanac
2. Harrico

3. Warrico
4. We
5. Wo
1. Wac!



Oh no! You're pointing at yourself, and so you're eliminated! That's not what we wanted. But if you start with someone else, they'll be eliminated instead. If you start with #4, they get eliminated in the first round. You'd then start the second round with #5 (the next person in line), eliminating #3; #5 also starts round three, which eliminates #5; then you start the fourth round with yourself, and eliminate #2. You've won!

Given the number of people in your group and the number of words in your counting rhyme, write a program that can determine who you should start counting with in order to guarantee that you are the last person standing.

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include a single line with two positive integers separated by spaces:

- N, the number of people in the group. Each person is identified by a unique number between 1 and N inclusive; you are #1.
- K, the number of words in your counting rhyme

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2
5 16
6 8
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Sample Output

For each test case, your program must print the number of the person with whom you should start counting in the first round to guarantee that you are not eliminated in any round.

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4
5
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