# 5087   Shuffling cards

A deck of $2N$ cards with distinct values of $1, 2, \ldots, 2N$ is given to the shuffling machine. At the beginning, the cards are arranged in the deck in ascending order from the top to the bottom. The shuffling machine executes a sequence of M instructions determined by M integers $k_1, k_2, \ldots, k_M$ for shuffling the cards. The instruction determined by the number k_i ($1 \leq |k_i| < N$), commands the machine to shuffle the cards as follows:

- If $k_i > 0$: remove a pile of $2k_i$ cards at the middle of the deck and stacks them on top of the deck.

- If $k_i < 0$: remove a pile of $-2k_i$ cards at the middle of the deck and inserts them into bottom of the deck.
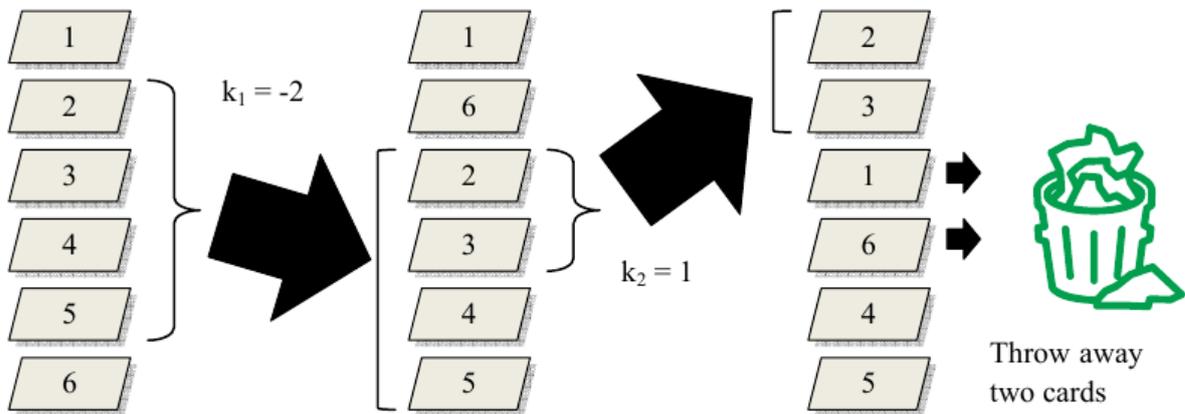
Mr. X received the deck after it has been shuffled according to M instructions. He wants to throw away some cards from the deck in such a way that the Throw away values of the remained two cards cards are in an increasing order from the top to the bottom. Given the M instructions for the shuffling machine, your task is to write a program to help Mr. X determine the minimum number of cards to be removed after the deck has been shuffled.

Input

The input file consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 20. The following lines describe the data sets.

Each data set consists of two lines. The first line contains two positive integers N and M ($2 \leq N \leq 10^9$; $0 \leq M \leq 10^5$) separated by a space. The second line contains M integer $k_1, k_2, \ldots, k_M$ separated by a space.

Output

For each data set, write in one line the minimum number of cards to be removed after the deck has been shuffled.

Sample Input

```
2
3 2
-2 1
1000000000 3
999999999 -1 2
```

Sample Output

```
2
7
```