

Arithmetic Progression Query

You have an array of size **N** initially filled with 0. You have **Q** queries. In each query, you will be given two integers **a** and **b**. For each query, you need to add **1** at the following valid indices: , $a - 2*b$, $a - b$, a , $a + b$, $a + 2 * b$ The indices that lie in the range **[1,n]** are only considered valid. Print the final array after the last update.

Input

The first line contains the number of test cases. Then T test cases follow. Every test case starts with two integers N and Q. After that, Q lines follow. In each line there will be two integers describing that query.

$$1 \leq T \leq 10$$

$$1 \leq N, Q, a, b \leq 100000$$

Output

Print the final array after the last query with the case number.

Example

Input:

1

5 1

1 2

Output:

Case 1: 1 0 1 0 1