I Jumping Frogs

At time 0, **R** red frogs and **G** green frogs are sitting on a straight line. All the positions of the frogs are non-negative integer numbers. Every second, all the frogs jump. Each of the frogs has its own velocity, i.e., every second the **i-th** frog jumps **Vi** units to its left or right depending on the color. Every red frog jumps to its right, and every green frog jumps to its left.

The line is divided into **N + 1** contiguous segment. The left end of the first segment is always 0 and the right end of the **N+1st** segment is 10^9. The segments are denoted by a sequence of **N** positive integers. For example, if **N = 1** and the sequence has 1 integer number 10, then there are two segments, one is from 0 to 10 and another is from 10 to 10^9, both inclusive.

You are given the initial positions of all the **R + G** frogs and a sequence of positive integers describing the segments. Find the minimum time it will take for all the frogs to reach a single segment. A frog is said to be on a segment if and only if it's sitting on some points inside the segment (including the endpoints). Please note that a frog is not said to be inside a segment when it's jumping.

Please note that, when a frog is on any of the N intermediate boundary points, they can be considered to be part of either the left or the right segment.

Input

Input starts with a single positive integer, **T ≤ 10**, on a single line, denoting the number of test cases.

The first line of each test cases will be a blank line. Next line will contain three positive integers **R**, **G** and **N** (**1 <= R, G <= 100,000, 1 <= N <=100,000).**

Next five lines will be as follows:

1. **R** non negative integers, where the **i-th** integer represents the position of the **i-th** red frog.
2. **R** non negative integers, where the **i-th** integer represents the velocity of the **i-th** red frog.
3. **G** non negative integers, where the **i-th** integer represents the position of the **i-th** green frog.
4. **G** non negative integers, where the **i-th** integer represents the velocity of the **i-th** green frog.
5. A sequence of N positive integers describing the segments. All the numbers are greater than 0 and are less than 10^9

Note that, every frogs' position and velocities are between 0 and 10^9, inclusive.

Please note that the input file is around 4 MB, use faster input/output routine.(i.e. scanf/printf instead of cin/cout for c++)

Output

For every case print the output in format, "**Case X: Y**", where **X** is the number of test case, starting from 1 and **Y** is the minimum time it takes for all the frogs to reach a single segment. If it's impossible for all the frogs to reach a single segment, then **Y** should be **-1**.

Sample Input	Output for Sample Input
2 1 1 1 10 10000 20 10000 1000000 2 2 1 1 2 99 100 1000 1001 100 200 100	Case 1: 0 Case 2: 1

Problem Setter: Muhammed Hedayet
Special Thanks: Hasnain Heickal