

## 13033 Jumping Frogs II

At time 0,  $F$  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  $V_i$  units. Every frog jumps to its right.

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  $(N + 1)$ -th segment is  $10^9$ . The segments are denoted by a sequence of  $N$  positive integers, the right end point of first  $N$  segments. Every segment except the first one starts from the first point after the right endpoint of the last segment.

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 11 to  $10^9$ , both inclusive.

You are given the initial positions of all the  $F$  frogs and a sequence of positive integers describing the segments. Find the minimum time it will take 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.

### Input

Input starts with a single positive integer,  $1 \leq T \leq 10$ , on a single line, denoting the number of test cases. Each of the following  $T$  test cases has the following 5 lines,

1. Blank line. To separate cases.
2. Two non-negative positive integers  $1 \leq F \leq 1000$ ,  $1 \leq N \leq 100,000$ .
3.  $F$  non negative integers, where the  $i$ -th integer represents the position of the  $i$ -th frog.
4.  $F$  non negative integers, where the  $i$ -th integer represents the velocity of the  $i$ -th frog.
5. A sequence of  $N$  positive integers describing the segments.

Note that, all the numbers in the input are greater than 0 and less than  $10^9$  where a limit is not specified.

### Output

For each case, print the minimum time it takes all the frogs to reach a single segment. If it's impossible for all the frogs to be on a single segment, print '-1'. For every case print the output on a single line.

### Sample Input

```
2

1 1
10
10000
1000000

2 1
1 200
199 100
100
```

**Sample Output**

Case 1: 0

Case 2: 1