Problem E: Lunch Line Wait Time

Filename: `e`
Time Limit: `12 seconds`

The dreaded lunchtime at the Student Union means waterlogged walks from and to the engineering buildings, hiding in the shade from the oppressive sun, and determining how to actually use Knight's Cash. On top of all of this is waiting in line for your food.

There are 2 main lines at which you could have ordered from. It's already too late; you spent most of your lunch period waiting to order your food. At the end of the day you wonder if you entered the line with the least number of people or if by following your friends you unwittingly entered the longest line.

Some of the campers are also interested in knowing if they made the right decision, so you decided to write a program to determine for a given day what lines many people should have theoretically entered. Note that arriving as one or more people are leaving the line means that you enter the line with the departing people.

Problem

Given a list of when people entered and left the 2 lines, and a list of times a camper could have arrived, determine for each theoretical camper the best line they could have gone into. You should assume the theoretical campers will not modify the answers for the queries regarding the future campers.

Input

The first line of input contains a single integer, **d**, representing the number of days the campers go to lunch. Following this will be **d** day descriptions.

The first line of each day description will contain 2 space separated integers, **n** and **q**, representing the number of people that waited in one of the 2 lunch lines and the number of theoretical camper arrivals respectively.

The following **n** lines will each contain a person description. A person description will consist of 3 space separated integers, L_i, A_i, and D_i, representing the line the person entered, the time at which the person entered, and the time at which the person departed.

The following **q** lines will each contain a theoretical camper arrival time represented as a single integer, T_i. Note that when a theoretical camper arrives at the same as another person, they would allow the other person to enter the line first, since the campers are all well mannered.

Output

For each theoretical camper print a line containing the word "`either`" (quotes for clarity) if the lines have the same number of people at the given arrival time. Otherwise, print the id of the line that is shorter (1 or 2).

Input Bounds and Corresponding Credit

- $1 \le d \le 10$
- $1 \le n, q \le 200{,}000$
- $1 \le L_i \le 2$
- $1 \le A_i < D_i \le 360{,}000$
- $1 \le T_i \le 360{,}000$

Samples

Input	Output
2 8 4 1 5 10 1 5 12 1 5 16 2 2 16 2 3 21 1 1 6 2 10 25 2 12 18 8 6 30 1 3 1 1 2 10 2 4 11 2 8 15 9	2 2 either 2 1