Problem: Movie Schedule [Medium]

Time Limit: 3 seconds

You have been asked to help prepare a program that prepares the time schedule for a movie theater. In this movie theater, time is measured in minutes only, starting with minute 0, until closing minute T.

The movie theater contains multiple cinema C, each showing a film on a repeating schedule. A cinema will start showing an assigned film at a specified minute time s_i. The film will continue playing for the entire duration d_i, followed by a pre-determined break period b_i. After the break, if there is sufficient time for the film to finish before the closing time (minute T), then the film will begin showing again.

Input

The first line has a single number N, the number of test cases. N test cases follow. On the first line of each test case will be two integers, the total number of cinemas C and the closing minute T respectively. The next C lines contains four integers: the unique cinema ID c_i, start time s_i, film duration d_i, and break period b_i respectively.

Output

For each test case, output a single line containing the string "Case #n:" (where n is the case number) followed by multiple lines indicating the start or end time of a movie. Each line should contain the time in minutes t_g, the cinema ID c_i, and either the word START or END.

The lines should be ordered according to chronological order (earlier times should be displayed before later ones). In case multiple films begin at the exact same time, display the line for the smaller cinema ID first. In case multiple films end at the exact same time, display the line for the smaller cinema ID first. When a film ends at the same time as another film starts, display the END lines before the START lines.

Constraints

- $1 \leq N \leq 20$
- $1 \leq C \leq 32$
- $300 \leq T \leq 1440$
- $1 \leq c_i \leq 999$
- $20 \leq d_i \leq T$
- $20 \leq s_i + d_i \leq T$
- $0 \leq b_i, t_g \leq T$

Sample Input	Sample Output
1 3 600 1 0 150 0 2 150 125 50 3 19 182 18	Case #1: 0 1 START 19 3 START 150 1 END 150 1 START 150 2 START 201 3 END 219 3 START 275 2 END 300 1 END 300 1 START 325 2 START 401 3 END 450 1 END 450 2 END 450 1 START 600 1 END