Problem L. Line Replacements

Input file:	`standard input`
Output file:	`standard output`
Time limit:	15 seconds
Memory limit:	1024 megabytes

Ordnungrad is a city whose inhabitants take pride in maintaining perfect order in all areas of life: the streets are always clean, trams always come according to the timetables, and the police department got closed when a city council ordinance declared that carrying out criminal activities within the city borders is no longer possible. This last titbit has caught the attention of Byteasar, the scrap collector.

The city tram network consists of n intersections, near p of them there are tram loops located, and the intersections are connected by $n-1$ two-way tracks such that it is possible to reach any intersection from any other in exactly one way. Byteasar has identified k poorly lit tracks. Each of the following k nights he plans to dismantle one of them and transport the obtained scrap material outside the city.

The city council will surely prefer to pretend that the tracks are being closed due to renovations rather than admit that such a serious disorder took place during their tenure... or at least that's what Byteasar is counting on. However, the Ordnungradians are very much attached to the fact that if there have been 10 tram runs per hour available on their street for years (counting all the lines going through this street), then next day there will also be exactly 10 runs – no more, no less. If any morning the city council failed to satisfy this requirement (on any active track), it would become obvious to everyone that the closures had not been planned at all! This is what Byteasar would like to avoid.

More precisely, on the j-th day (for each $j \leq k$) it should be possible to create a grid of replacement lines satisfying the following conditions:

- Each line must start and end its course at some tram loops, making a certain number of runs per hour (the same in both directions), and its route must be a *simple path* [6] because trams cannot just turn back.
- No line can run through a track that Byteasar has stolen since the 1st until the j-th night.
- If the i-th track has not been stolen, then on this day all the lines running through this track must make c_i runs (each way) per hour **in total**.

Of course, no local programmer would be willing to help Byteasar, so he turned to you. Find the correct order of track thefts or state that no such order exists. Observe that the grid of replacement lines for each day can be created independently of the grids for other days, it only needs to meet the conditions described.

Note: It is possible that the values c_i measured by Byteasar do not describe a correct grid of lines (after all, anyone can make a mistake while counting the passing trams) – in such a situation, you also need to inform Byteasar about his error. In other words, you need to verify the conditions described above also on the day number $j = 0$, i.e. before the first theft.

Input

The first line of input contains the number of test cases z ($1 \leq z \leq 15\,000$). The descriptions of the test cases follow.

The first line of the test case contains two integers n, p ($2 \leq p \leq n \leq 500\,000$) denoting the number of intersections and tram loops, respectively.

The intersections are numbered from 1 to n, while the tracks are numbered from 1 to $n-1$.

[6] This means that if the route of a given line leads along the track from the intersection u to the intersection v (and it does not end in v), then it must further lead through a track from v to an intersection other than u.

The next line contains p different integers p_i ($1 \le p_i \le n$) in ascending order, describing the intersections at which the loops are located. You can assume that if there is only one track leaving an intersection, then there is definitely a loop at that intersection (but loops can also be located at other intersections).

The following $n-1$ lines describe the tracks. Each of them contains three integers u_i, v_i, c_i ($1 \le u_i, v_i \le n$, $u_i \ne v_i$, $1 \le c_i \le 10^9$) meaning that track number i connects the intersections u_i and v_i, and according to Byteasar's measurements c_i trams per hour pass this track in each direction.

The next line contains one integer k ($1 \le k \le n-1$).

The last line of the test case contains k different integers k_i ($1 \le k_i \le n-1$) in ascending order, representing the tracks Byteasar would like to steal.

Sum of n among all test cases does not exceed 2 000 000.

Output

For each data set, if there exists an order of track thefts fulfilling the conditions described, on the first line of the output write the single word `TAK`. In the next line write k integers r_i ($1 \le r_i \le n-1$), where r_i is the identifier of the track that Byteasar should dismantle during the i-th night. Each of the k tracks chosen by Byteasar should appear on this list exactly once. If there is more than one correct answer, you can output any of them.

If the order you are looking for does not exist, or **if the input values c_i do not describe any valid grid of lines** even before the thefts begin[7], print the word `NIE`.

Example

standard input	standard output
2 7 5 1 2 3 4 6 7 1 3 7 2 4 7 3 4 7 4 3 5 3 1 5 6 1 2 2 3 7 5 1 2 3 4 6 7 1 3 7 2 4 7 3 4 7 4 3 5 3 1 5 6 1 4 2 3 5 6	TAK 2 3 NIE

Notes

In the first test case, the theft of first track 2 and then track 3 will allow city officials to develop the correct network of replacement lines after each change:

[7] In such a situation, Byteasar will have to repeat his research in order to collect correct data on the frequencies of the trams.

- Before the first theft, the following grid of lines fulfils the objectives of the task: line going through intersections 1-7-2 performing 3 runs [per hour, each way], line 2-7-3-5-6 performing 1 run and line 3-7-4 doing 3 runs.
- After the theft of track number 2 (connecting vertices 2 and 7), it is possible to develop the following grid of substitute lines: line 1-7-3 performing 1 run, line 1-7-3-5-6 performing 1 run, line 1-7-4 performing 1 run, line 3-7-4 performing 2 runs.
- After the theft of tracks number 2 (connecting vertices 2 and 7) and number 3 (connecting vertices 3 and 7), it is possible to develop the following grid of substitute lines: line 1-7-4 performing 3 runs, line 3-5-6 performing 1 run.

The opposite order (3 2) is also a correct answer.

In the second test case, Byteasar would also like to steal tracks 5 and 6. Regardless of which of the two tracks he would dismantle earlier, after this theft it would not be possible to develop a line grid that would properly serve the other track. Therefore, the answer is `NIE`.