Problem L. Light It Down

Input file:	`standard input`
Output file:	`standard output`
Time limit:	10 seconds
Memory limit:	1024 megabytes

You are given a tree with $\mathbf{N}$ nodes. The tree's nodes are numbered 1 through $\mathbf{N}$ and its edges are numbered 1 through $\mathbf{N-1}$. Each edge is associated with a distance.

There are $\mathbf{M}$ lightbulbs, numbered from $\mathbf{1}$ to $\mathbf{M}$. For each lightbulb i you are given an integer p_i - the node number where the lightbulb is, and no two lightbulbs in the same node. Each lightbulb can either be ON or OFF. Each input case will contain the initial state.

You're starting from node $\mathbf{S}$, and need to turn off all lightbulbs. And we can guarantee that there is no lightbulb at the starting point $\mathbf{S}$, and there is no more than one lightbulb in one node.

You can repeat the following operation until all lightbulbs are OFF: If you are currently located in node u, you will randomly select a new node v with equal probability from $\{v\colon v \neq u$, v should have no lightbulb if u has a lightbulb$\}$. Then you will move to node v by the shortest path and flip (ON $\rightarrow$ OFF, OFF $\rightarrow$ ON) the lightbulb in v if node v has lightbulb.

Your task is to compute the expected total distance to light down all lightbulbs.

Input

The first line of the input gives the number of test case, $\mathbf{T}$ ($1 \leq \mathbf{T} \leq 10$). $\mathbf{T}$ test cases follow.

For each case, the first line contains three integers $\mathbf{N}$, $\mathbf{M}$, and $\mathbf{S}$ ($1 \leq \mathbf{N} \leq 100,000$; $1 \leq \mathbf{M} < \mathbf{N}$; $1 \leq \mathbf{S} \leq \mathbf{N}$) – the number of nodes, the number of lightbulbs, and the start position.

The i-th line of the next $\mathbf{N-1}$ lines describes the i-th edge: three integers u, v, w ($1 \leq u, v \leq \mathbf{N}$; $u \neq v$; $1 \leq w \leq 100,000$) denotes an edge between u and v with distance w.

The i-th line of the next $\mathbf{M}$ lines contains two integers p_i ($1 \leq p_i \leq \mathbf{N}$; $p_i \neq \mathbf{S}$) and s_i ($0 \leq s_i \leq 1$) – the positions of the i-th lightbulb and the initial states of the i-th lightbulb, where 1 means ON and 0 mean OFF.

Output

For each test case, output one line containing "Case #x: y", where x is the test case number (starting from 1) and y is answer modulo (10^9+7). More specifically, if the answer can be formed as an irreducible fraction $\frac{A}{B}$, then y will be $(A \cdot B^{-1}) \bmod (10^9+7)$.

Example

standard input	standard output
3 3 2 1 1 2 1 1 3 1 2 1 3 1 3 1 1 1 2 1 1 3 1 2 1 3 1 3 1 2 1 1 3 1 2 1	Case #1: 7 Case #2: 333333338 Case #3: 666666674