Treehouse

During summer break, Lea and her friends love to climb trees. The bigger the tree, the more fun it is!

This summer, they explored the nearest forest and climbed the biggest tree they could find. Then, each of them built a treehouse on the spot they liked most and settled in to relax. After a while, Lea wanted to visit all of her friends' treehouses to see how they built them and have a look at all the glorious treehouses.

She already planned a scenic route through the whole tree to have a look at all the treehouses from different angles so she can decide who has the coolest treehouse. Can you tell her how far she has to climb to complete the entire route?

Input

The first line of the input contains an integer t. t test cases follow.

Each test case starts with single line containing n, the number of branching points of the tree, indexed from 1 to n. Branching point 1 is the root of the tree, down on the ground. Lea starts in branching point 1 and ends in the last node of the tour. If she has not come back to branching point 1, Lea will spend the night in one of the treehouses she visits.

n lines follow, with the i-th line containing an integer c_i followed by c_i integers $b_{i,j}$ indicating that there are tree branches connecting branching point i to branching point $b_{i,j}$.

A single line follows containing an integer v followed by v integers v_i indicating which branching points Lea wants to visit.

Output

For each test case, print a line containing "Case #i: x" where i is its number, starting at 1 and x is the minimum number of branches Lea needs to climb along to visit all v branching points in the order specified. Each line of the output should end with a line break.

Constraints

- $1 \leq t \leq 20$
- $1 \leq n \leq 5000$
- $0 \leq c_i \leq (n-1)$
- $1 \leq b_{i,j} \leq n$
- The tree is connected and has $n-1$ branches.
- $1 \leq v \leq 100000$
- $1 \leq v_i \leq n$

Sample explanation

In the first sample, case 1 there are 5 branching points in the tree. Lea starts on the ground, so she has to climb 3 branches to get to branching point 5. Then, she climbs back down to 1, again along 3 branches. Now, she climbs up to branching point 4 (along 2 branches) and then to branching point 3 (along another 2 branches). Thus the result is $3+3+2+2=10$.

Sample Input 1	Sample Output 1
2 5 1 2 2 3 4 0 1 5 0 4 5 1 4 3 6 2 3 5 0 1 6 0 2 2 4 0 6 3 6 3 5 2 4	Case #1: 10 Case #2: 8