Problem A: Dan the Delivery Man

Filename: `dan`

Time limit: `3 seconds`

Points: 10

Meet Dan the Delivery Man. As his name suggests, Dan is a man, and he must make some deliveries. He resides in a city with n buildings, each labeled a distinct number between 1 and $\boldsymbol{n}$ inclusive. The city also has $\boldsymbol{n} - 1$ sidewalks, with each sidewalk connecting 2 buildings to each other and taking exactly 1 minute to cross. Furthermore, the city was constructed in such a way that there exists a path between any two buildings by traveling only on sidewalks.

Now Dan the Delivery Man starts each day at work, he begins at building 1. He must deliver some packages to a set of buildings, which he does simply by taking some sequence of sidewalks. However, the city has a unique mode of transportation – portals! A portal is placed at each building except for building 1, and they function in a unique way. If Dan is currently at a certain building b_0 and decides to take the portal at that building, he will be teleported to the building b_1 that satisfies both of the following:

1. It takes less time to travel from b_1 to building 1 than from b_0 to building 1.
2. Buildings b_0 and b_1 are connected by a sidewalk.

When Dan takes a portal, it works instantaneously, taking no time. With this information, Dan the Delivery Man now wants to know the plan that minimizes the amount of time to complete all his deliveries from when his shift began.

The Problem

Given a valid construction of a city, as well as the buildings which Dan must make deliveries to, help Dan determine the minimum number of minutes needed to complete all his deliveries.

The Input

The first line of input contains an integer $\boldsymbol{t}$ ($1 \leq \boldsymbol{t} \leq 100$), representing the number of input cases.

The first line of each test case contains $\mathbf{2}$ integers $\boldsymbol{n}$ and $\boldsymbol{d}$ ($1 \leq \boldsymbol{d} \leq \boldsymbol{n} \leq 10^4$), representing the number of buildings downtown and the number of buildings Dan must deliver to, respectively.

The following line contains $n-1$ integers, the i^{th} of which is $\boldsymbol{p_{i+1}}$ ($1 \leq \boldsymbol{p_{i+1}} < i+1$), representing the building number that the portal from building $\boldsymbol{i+1}$ goes to $\boldsymbol{p_{i+1}}$. This indicates that there is a bidirectional sidewalk which connects buildings $i+1$ and p_{i+1}, and that Dan can use a portal to instantly travel from building $\boldsymbol{i+1}$ to building $\boldsymbol{p_{i+1}}$.

The following line contains $\boldsymbol{d}$ distinct integers, the i^{th} of which is $\boldsymbol{x_i}$ ($1 \leq \boldsymbol{x_i} \leq \boldsymbol{n}$), representing one of the buildings Dan must deliver to.

The Output

For each test case, print 1 integer on its own line, representing the minimum number of minutes it takes Dan to complete all his deliveries. His deliveries are complete the moment he makes the last delivery.

Sample Input

```
3
5 2
1 1 2 2
2 5
7 3
1 1 2 3 3 4
2 4 7
7 4
1 1 2 3 3 4
4 3 5 6
```

Sample Output

```
2
3
5
```