

Corporate Gifting

The fine people of Corpro Corp. are a festive bunch. Every holiday season, everybody buys a gift for their manager. A cynic might say that the employees are just trying to bribe their way to a better performance review, but if you asked them yourself, they'd say they just wanted to spread cheer.

The fine people of Corpro Corp. are a frugal bunch. When they buy gifts, they cooperate to collectively buy the least expensive gifts that they can. A cynic might say that the employees are cheap, but if you asked them yourself, they'd say it's the thought that counts.

There are N employees working at Corpro Corp., and each of them has a manager, except for the CEO who has no manager (the CEO also buys a gift every year, but she donates it to charity). The employees each have a unique employee ID which is an integer from 1 to N . As you might expect, the CEO has the ID 1.

If there exists a set of two or more employees $\{p_1, \dots, p_k\}$ such that, for all $i < k$, p_i is the manager of p_{i+1} , then we say that p_1 is "responsible for" p_k . There are never two employees who are responsible for each other. That would be a silly hierarchy indeed.

There are N kinds of gifts available for purchase, and the i th kind of gift costs i dollars. That is, the prices of the different kinds of gifts are $\{\$1, \$2, \$3, \dots, \$N\}$. There are N copies of each gift available for purchase.

The only thing that stops all employees from purchasing gifts that cost \$1 is the awkwardness of buying a gift for their manager that's the same as the one their manager is giving away. No employee would ever do such a thing!

For example, in a company with just 2 employees, at least \$3 must be spent in total. If employee #1 (the CEO) buys a \$1 gift to donate to charity, then employee #2 cannot buy a \$1 gift for employee #1 (their manager), but they can buy a \$2 gift instead. Note that it would be equally optimal for the CEO to buy a \$2 gift, while receiving a \$1 gift from her subordinate.

What's the minimum possible total expenditure across the whole company during the gift exchange?

Input

Input begins with an integer T , the number of corporate hierarchies to consider. Each hierarchy is made up of two lines. The first line contains the integer N . The second line contains N space-separated integers. The i th integer is the employee ID of the manager of employee i , with the exception that the first integer is always 0, denoting that the CEO has no manager.

Output

For the i th hierarchy, print a line containing "Case # i :" followed by the smallest amount of money the entire company would need to spend.

Constraints

$1 \leq T \leq 100$

$1 \leq N \leq 200,000$

NOTE: The input file is about 10-20MB.

Explanation of Sample

In the first test case, the CEO will spend \$2, and the other employees will spend \$1.

In the second test case, employees #2 and #3 will spend \$2, and the other employees will spend \$1.

Sample Input

```
5
3
0 1 1
8
0 1 1 2 2 3 3 3
5
0 1 2 3 4
9
0 1 2 3 4 5 5 5 5
8
0 1 1 1 1 2 2 2
```

Sample Output

Case #1: 4

Case #2: 10

Case #3: 7

Case #4: 12

Case #5: 11



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