Problem G. Paimon's Tree

Paimon has found a tree with $(n+1)$ initially white vertices in her left pocket and decides to play with it. A tree with $(n+1)$ nodes is an undirected connected graph with n edges.

Paimon will give you an integer sequence $a_1, a_2, \cdots, a_n$ of length n. We first need to select a vertex in the tree and paint it black. Then we perform the following operation n times.

During the i-th operation, we select a white vertex x_i which is directly connected with a black vertex y_i by an edge, set the weight of that edge to a_i and also paint x_i in black. After these n operations we get a tree whose edges are all weighted.

What's the maximum length of the diameter of the weighted tree if we select the vertices optimally? The diameter of a weighted tree is the longest simple path in that tree. The length of a simple path is the sum of the weights of all edges in that path.

Input

There are multiple test cases. The first line of the input contains an integer T $(1 \le T \le 5 \times 10^3)$ indicating the number of test cases. For each test case:

The first line contains an integer n $(1 \le n \le 150)$ indicating the length of the sequence.

The second line contains n integers $a_1, a_2, \cdots, a_n$ $(1 \le a_i \le 10^9)$ indicating the sequence.

For the following n lines, the i-th line contains two integers u_i and v_i $(1 \le u_i, v_i \le n+1)$ indicating that there is an edge connecting vertex u_i and v_i in the tree.

It's guaranteed that there is at most 10 test cases satisfying $n > 20$.

Output

For each test case output one line containing one integer indicating the maximum length of the diameter of the tree.

Example

standard input	standard output
2 5 1 7 3 5 4 1 3 2 3 3 4 4 5 4 6 1 1000000000 1 2	16 1000000000

Note

For the first sample test case, we select the vertices in the order of $1, 3, 4, 5, 2, 6$, resulting in the weighted tree of the following image. It's obvious that the longest simple path is of length 16.