Problem I : Black Family Tree

A Time-Turner is a magical device used to travel back in time, spend some time there, and then get back to the current time.

Rose Granger has found a Time-Turner in the libraries of Hogwarts and took it upon herself to go back in time and take out some members of the Black family, in order to save the lives of muggles (humans without any magical ability).

The Black family has n members, numbered 1 to n in order of being born. Member 1 is the first member of the Black family with a recorded history. For each i ($2 \leqslant i \leqslant n$), member i is a direct descendant of member p_i ($1 \leqslant p_i < i$). i.e., member p_i and all of his/her ancestors are an ancestor of member i. It is also written in the books that the i-th member of the Black family is responsible for the death of c_i muggles.

Now Rose has q options. The j-th option is to use the Time-Turner to go back in time and take out all the members from a_j to b_j ($a_j \leqslant b_j$) and then come back to the current time. As a consequence of this action, any member of the Black family who has an ancestor among members a_j to b_j will never be born. For any member i who is among members a_j to b_j (i.e. $a_j \leqslant i \leqslant b_j$), or has an ancestor among members a_j to b_j, Rose will save c_i lives.

For each option, help Rose to find out how many lives she will save if she takes that option.

Input

The first line of the input contains two integers n and q ($2 \leqslant n \leqslant 10^5, 1 \leqslant q \leqslant 10^5$). The second line contains n space-separated integers c_1 to c_n ($0 \leqslant c_i \leqslant 10^4$). The third line contains $n-1$ integers p_2 to p_n ($1 \leqslant p_i < i$). Each of the next q lines contains one option; The j-th line contains two integers a_j and b_j ($1 \leqslant a_j \leqslant b_j \leqslant n$).

Output

For each j ($1 \leqslant j \leqslant q$), output the number of lives Rose will save if she takes the j-th option.

Example

Standard Input	Standard Output
6 5 1 2 4 8 16 32 1 2 2 1 5 1 1 2 3 4 5 2 6 6 6	63 14 56 62 32