时间限制：C/C++/Rust/Pascal 4秒，其他语言8秒
空间限制：C/C++/Rust/Pascal 512 M，其他语言1024 M
Special Judge, 64bit IO Format: %lld

题目描述

It's a colorful world in Color Town!

Color Town is well known for each place of interest: the Colorful Tree. The Colorful Tree is not a real tree. It's actually a gigantic painting on the ground which looks like a tree if you take a hot air balloon and see the painting from up in the sky.

Families in the town work together to renew the painting each year. There are n families in the town, and there are n parts that form the whole painting. Family i paints Part i.

Why does the painting look like a tree? Actually, the structure of the painting is almost like a rooted tree in graph theory! Each part other than Part 1 has its parent, and the parent of Part u is p_u . Part i and Part j are adjacent if and only if i is the parent of j or j is the parent of i .

Each family produces its own paint. But since the paint producing technique of the family can be unstable, the color of the paint they produce can be quite different. We note each color as an integer, and the color of the paint produced by Family i can be a random integer in the range $[l_i, r_i]$ equiprobably.

To make work less tiring, each family paints the part entirely using the paint it produces this year. Together, they form a beautiful painting!

There is another thing about paint that you should know: as time passes, the family may lose or improve its technology, so $[l_i, r_i]$ can change over time. Relevant updates will be provided.

To show the painting to the world, the mayor of the town, Sean, decides to take a picture of the painting each year. In the i-th year, when he takes a photo of the painting, the photo taken shows the parts in the subtree of u_i fully, and no other parts are shown in the photo. Part i is in the subtree of Part j if there is a sequence $v_1, v_2, \ldots, v_k$ such that $v_1 = i, p_{v_t} = v_{t+1}\ (1 \le t < k), v_k = j$. Specially, Part i is in the subtree of Part i .

Sean wants to tell others how colorful the photo is, so he defines the colorfulness as the number of great components in the photo. A component is an area that is in one color, and any point in the area can go through points in the components to get to another point. A great component is a component which can't be completely covered by any other component.

Let the colorfulness be C_i in the i-th year. As the randomness of the paints produced, C_i can be a random variable each year. To learn more information about C_i, Sean asks you about the expectation and the variance value of C_i. Can you help him?

Recall that the variance of a random variable X is $\mathrm{Var}(X) = \mathrm{E}[(X - \mathrm{E}X)^2]$ where $\mathrm{E}X$ is the expectation of X .

It's guaranteed that the root of the tree is 1, and the tree (except the example) is randomly generated this way: