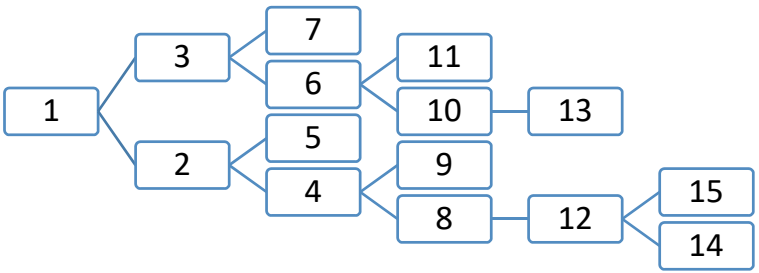
Problem 4: Tree

We need to create a genealogy tree, so we can determine the relationship between persons: cousin or descendant. Each person has at most 2 children. You are given as input the parents and their children and a sequence of requests to determine the relationship between two persons. The format of the output is:

1. A and B descendant-x
2. C and D cousin-m-n-p



The first format means that between A and B there is a relationship of descendant with distance x (i.e. the number of edges between A and B), if x=1, it means that A is parent to B, or B parent of A. If x=2, A is grand-parent of B, or B is the grand-parent of A, etc. The second format C is cousin to D, where C has a distance of m from the first common ancestor of D, where D has a distance of n from the first common ancestor with C, where the first common ancestor is p.

A sample input:

Number of persons: N = 15

Parent	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Child1	2	4	6	8	-	10	-	12	-	13	-	14	-	-	-
Child2	3	5	7	9	-	11	-	-	-	-	-	15	-	-	-

Requests:

Person 1	1	2	4	12	8	12	13
Person 2	2	12	6	7	5	9	6

A sample output:

1 and 2 are descendant-1
2 and 12 are descendant-3
4 and 6 cousin-2-2-1
12 and 7 cousin-4-2-1
8 and 5 cousin-2-1-2
12 and 9 cousin-2-1-4
13 and 6 descendant-2

- Write a C++ program to solve this problem, given a random input from a text file as shown in the sample input, including requests, then give the output as shown in the sample output. Give the complexity of your program.