Problem Trees

Little Tree is interested in trees of various sizes. She has a rooted binary tree T (i.e. one where every vertex has at most 2 children), *not necessarily a balanced tree*, in front of her, whose root is denoted by 1 and whose vertices are labeled $1, \dots, 2^N$. The label of any vertex is always strictly less than any of its children.

A set of vertices S is called *valid* if no vertex in S is the ancestor of any other vertex in S. The value of S, denoted by $\mathrm{val}(S)$, is given by the number of vertices within the tree that have *any* vertex of S as an ancestor. (We consider a node to be its own ancestor.) In other words, it is the sum of the sizes of the subtrees rooted at vertices in S.

Her enemy, Little Cactus, challenges her to the following task: Given N and the tree T, create as many *valid*, *nonempty* sets $S_1, \dots, S_K$ as possible, such that

$$|S_1| + \dots + |S_K| \leq N \times 2^{N-1} + 1$$

and $\mathrm{val}(S_i) \neq \mathrm{val}(S_j)$ for any $i \neq j$.

Input data

The first line of the input file contains the integer N. The second line contains integers $p_2, \dots, p_{2^N}$, separated by spaces, where p_i denotes the parent of node i.

Output data

Output K, the number of sets you can create, followed by each of the K sets on its own line. To output a set, first output its size, then its elements, separated by spaces.

Restrictions

- $N \leq 18$.
- If you output an incorrect solution (i.e. one using too many vertices, or where two sets have the same value) then you will receive 0 points for a test. Otherwise, the fraction of the score you will receive for a particular test will be equal to $(K/2^N)^{1.5}$.

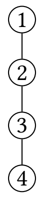
#	Points	Constraints
1	7	$p_i = i - 1$ for $i = 2, \dots, 2^N$
2	12	$N = 4$
3	13	$N = 6$
4	21	$N = 9$
5	26	$N = 11$
6	21	No further restrictions

Examples

Input data	Output data
2 1 2 3	4 1 4 1 3 1 2 1 1
2 1 2 2	4 1 4 2 3 4 1 2 1 1

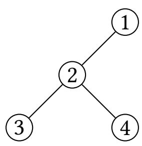
Explanation

First case. The tree is given by



We see that the sets $S_1 = \{4\}$, $S_2 = \{3\}$, $S_3 = \{2\}$, $S_4 = \{1\}$ all have distinct values (namely 1, 2, 3, 4 respectively), and have total size $4 \le 2 \times 2^{2-1} + 1 = 5$. Hence this output is correct.

Second case. The tree is given by



We see that the sets $S_1 = \{4\}$, $S_2 = \{3, 4\}$, $S_3 = \{2\}$, $S_4 = \{1\}$ all have distinct values (namely 1, 2, 3, 4 respectively), and have total size $5 \le 2 \times 2^{2-1} + 1 = 5$. Hence this output is correct.