Problem C : Science Fiction

Arts and literature have always been influenced by science. This appears, for example, in Christopher Nolan movies. But, there is a scientist who is doing his research on a hypothesis based on fictional novels.

Dr. Khosro, a theoretical physicist, does research on parallel worlds with high-dimensions, inspired by Isaac Asimov's novels. During his research, he needs a method of sorting in his imaginary high-dimension network of planets. In Dr. Khosro's imaginary n-dimensional world, there are 2^n planets and a wormhole network connecting them. The network is like an n-dimensional hypercube. The planets are numbered with non-negative integers less than 2^n, and there is a wormhole from planet a to planet b if and only if the n-bit binary representations of a and b differ in exactly one bit-position. In Dr. Khosro's model, there is a number written on each planet and we can swap the numbers of two planets only if there is a direct wormhole between them. You are given the numbers written on each planet, construct a valid sequence of swaps that makes the numbers sequence sorted from smallest to largest. Formally, if the number written on the planet number i $(0 \leqslant i < 2^n)$ is denoted by a_i, you have to construct a sequence of valid pairwise swaps that makes the sequence $a = \langle a_0, a_1, ..., a_{2^n-1} \rangle$ in increasing order.

Input

The first line of input consists of n $(1 \leqslant n \leqslant 10)$, the dimension of Dr. Khosro's imaginary world. The next line contains 2^n **distinct** integers, indicating $a_0, a_1, \ldots, a_{2^n-1}$ $(0 \leqslant a_i \leqslant 10^6)$.

Output

Print the numbers of your swaps in the first line. Your answer will be considered correct if this number is non-negative and less than 12 000. Then in the following lines, print the sequence of swaps. In your solution, every swap must be between two planets with a direct wormhole between them.

Example

Standard Input	Standard Output
2 3 2 10 4	2 0 1 2 3

Standard Input	Standard Output
1 10 100	0