E. Complete the Permutations

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

ZS the Coder is given two permutations p and q of $\{1, 2, ..., n\}$, but some of their elements are replaced with 0. The *distance* between two permutations p and q is defined as the minimum number of moves required to turn p into q. A move consists of swapping exactly 2 elements of p.

ZS the Coder wants to determine the number of ways to replace the zeros with positive integers from the set $\{1, 2, ..., n\}$ such that p and q are permutations of $\{1, 2, ..., n\}$ and the distance between p and q is exactly k.

ZS the Coder wants to find the answer for all $0 \le k \le n - 1$. Can you help him?

Input

The first line of the input contains a single integer n ($1 \le n \le 250$) — the number of elements in the permutations.

The second line contains n integers, $p_1, p_2, ..., p_n$ ($0 \le p_i \le n$) — the permutation p. It is guaranteed that there is at least one way to replace zeros such that p is a permutation of $\{1, 2, ..., n\}$.

The third line contains n integers, $q_1, q_2, ..., q_n$ ($0 \le q_i \le n$) — the permutation q. It is guaranteed that there is at least one way to replace zeros such that q is a permutation of $\{1, 2, ..., n\}$.

Output

Print n integers, i-th of them should denote the answer for $k = i - 1$. Since the answer may be quite large, and ZS the Coder loves weird primes, print them modulo $998244353 = 2^{23} \cdot 7 \cdot 17 + 1$, which is a prime.

Examples

input

```
3
1 0 0
0 2 0
```

output

```
1 2 1
```

input

```
4
1 0 0 3
0 0 0 4
```

output

```
0 2 6 4
```

input

```
6
1 3 2 5 4 6
6 4 5 1 0 0
```

output

```
0 0 0 0 1 1
```

input

```
4
1 2 3 4
2 3 4 1
```

output

```
0 0 0 1
```

Note

In the first sample case, there is the only way to replace zeros so that it takes 0 swaps to convert p into q, namely $p = (1, 2, 3)$, $q = (1, 2, 3)$.

There are two ways to replace zeros so that it takes 1 swap to turn p into q. One of these ways is $p = (1, 2, 3)$, $q = (3, 2, 1)$, then swapping 1 and 3 from p transform it into q. The other way is $p = (1, 3, 2)$, $q = (1, 2, 3)$. Swapping 2 and 3 works in this case.

Finally, there is one way to replace zeros so that it takes 2 swaps to turn p into q, namely $p = (1, 3, 2)$, $q = (3, 2, 1)$. Then, we can transform p into q like following: .