Monk and Multiplication

The Monk learned about priority queues recently and asked his teacher for an interesting problem. So his teacher came up with a simple problem. He now has an integer array A*A*. For each index i*i*, he wants to find the product of the largest, second largest and the third largest integer in the range [1,i][1,*i*].

Note: Two numbers can be the same value-wise but they should be distinct index-wise.

Input Format

The first line contains an integer N*N*, denoting the number of elements in the array A*A*.

The next line contains N*N* space separated integers, each denoting the ith integer of the array A*A*.

Constraints:

- 1≤N≤1000001≤*N*≤100000
- 0≤A[i]≤10000000≤*A*[*i*]≤1000000

Output Format

Print the answer for each index in each line. If there is no second largest or third largest number in the array A upto that index, then print "-1", without the quotes.

Sample test

inputcopy
5 1 2 3 4 5
outputcopy
-1 -1 6 24 60

Explanation for sample test

There are 5 integers 1,2,3,4 and 5.

For the first two indexes, since the number of elements is less than 3, so -1 is printed.

For the third index, the top 3 numbers are 3,2 and 1 whose product is 6.

For the fourth index, the top 3 numbers are 4,3, and 2 whose product is 24.

For the fifth index, the top 3 numbers are 5,4 and 3 whose product is 60.