

4528 Schedule Pairs of Jobs

In a factory, there are n pairs of jobs, (p_i, q_i) , $i = 1, 2, \dots, n$, to be scheduled. Each job, p_i or q_i , needs 1 unit of time to process. All the jobs p_i , $i = 1, 2, \dots, n$, must be scheduled before of all the jobs q_i , $i = 1, 2, \dots, n$. The order among the jobs p_i , $i = 1, 2, \dots, n$, as well as the order among the jobs q_i , $i = 1, 2, \dots, n$, is not important. However, it is required that the time between p_i and q_i , measured from the starting time of p_i to the starting time of q_i , should be at most d_i , for $i = 1, 2, \dots, n$.

Given a sequence of n positive integers d_1, d_2, \dots, d_n , we want to know whether these n pairs of jobs can be scheduled in the time interval $[0, 2n]$ or not. We say that the problem is *solvable* if the n pairs of jobs can be scheduled in a time interval of length $2n$ units, in such a way that the time between p_i and q_i is at most d_i , for $i = 1, 2, \dots, n$.

For example, for $n = 3$, the sequence 1, 3, 5 is solvable, since we can schedule these 3 pairs of jobs as follows:

p_3	p_2	p_1	q_1	q_2	q_3
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The sequence 3, 3, 4, 6 is also solvable, since we can schedule the jobs in the following way:

p_3	p_4	p_2	p_1	q_3	q_2	q_1	q_4
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In this problem, you are going to design a computer program to schedule pairs of jobs with the above constraints.

Technical Specification

Assume that $n < 16$, and each $d_i < 2^{31}$. For simplicity, assume that $d_1 \leq d_2 \leq \dots \leq d_n$, $\sum_{i=1}^k d_i \geq k^2$ for $1 \leq k < n$, and $\sum_{i=1}^n d_i = n^2$. Note that, in this case, if the problem is solvable then the time between each pair of jobs (p_i, q_i) is exactly d_i .

If the solution is not unique, try to schedule the jobs so that the job q_i with smaller index is finished as early as possible. For example, let the input requirements be '3 3 4 6'. Then print out the solution 'p4 p1 p2 p3 q1 q2 q4 q3'.

Input

Input file contains a set of test cases. Each test case contains a positive integer n , followed by n integers d_i , $1 \leq i \leq n$. The last test case is followed by a line containing only one integer '0'.

Output

Print the job in ascending order of their starting time. Print one line for each test case and for readability print a space before each 'p' and 'q'. If the pairs of jobs cannot be scheduled, then print the message 'no solution' in that line.

Sample Input

```
3
1 3 5
4
3 3 4 6
6
4 4 4 8 8 8
0
```

Sample Output

```
  p3 p2 p1 q1 q2 q3
  p4 p1 p2 p3 q1 q2 q4 q3
no solution
```