Problem K. Strips

Time limit: 1 second
Memory limit: 1024 megabytes

There are w cells arranged in a row, numbered from 1 to w from left to right. Among the cells, n of them are red, m of them are black, and the remaining $(w - n - m)$ cells are white.

You need to cover all the red cells with some strips. Each strip must cover k continuous cells. Find a way to cover all red cells while satisfying all the following constraints:

- Each red cell is covered by a strip.
- No black cell is covered by a strip.
- No two strips cover the same cell. That is, each cell is covered by at most one strip.
- The number of strips used is as small as possible.

Input

There are multiple test cases. The first line of the input contains an integer T indicating the number of test cases. For each test case:

The first line contains four integers n, m, k and w ($1 \le n, m \le 10^5$, $1 \le k \le w \le 10^9$, $n + m \le w$), indicating the number of red cells, the number of black cells, the length of each strip and the total number of cells.

The second line contains n integers $a_1, a_2, \cdots, a_n$ ($1 \le a_i \le w$), indicating that cell a_i is red.

The third line contains m integers $b_1, b_2, \cdots, b_m$ ($1 \le b_i \le w$), indicating that cell b_i is black.

It's guaranteed that the given $(n + m)$ cells are distinct. It's also guaranteed that neither the sum of n nor the sum of m of all test cases will exceed 2×10^5.

Output

For each test case:

If it is possible to cover all the red cells while satisfying all constraints, first output one line containing one integer c indicating the smallest number of strips used. Then output another line containing c integers $l_1, l_2, \cdots, l_c$ ($1 \le l_i \le w - k + 1$) separated by a space, where l_i is the left-most cell covered by the i-th strip. If there are multiple valid answers, you can output any of them.

If it is not possible to do so, just output `-1` in one line.

Example

standard input	standard output
4 5 2 3 16 7 11 2 9 14 13 5 3 2 4 11 6 10 2 1 11 2 1 2 6 1 5 3 2 1 2 6 1 5 2	4 6 2 14 9 -1 2 1 4 -1