

## Lab 1 (Sets)

### Problem #1 | To be set

A set is a model for collection of different things, thus all elements in the set must be unique. You can change any array you received to a set. For example, an array named “dummy” has members in the array as {4, 5, 5, 6, 7, 8, 8, 9, 9, 9, 9, 9, 10, 10, 11, 19, 20, 25, 25, 30} with 20 elements, is equivalent to a set of {4, 5, 6, 7, 8, 9, 10, 11, 19, 20, 25, 30}, containing 12 different elements.

Your task is to find the set that is equivalent to the array given and find the number of elements in the set.

#### Input

The input consists of two lines:

First Line	An integer $n$ in which $1 \leq n \leq 1,000$ as the number of elements in an array.
Second Line	A sequence of non-decreasing order array of integer $a_1 a_2 \dots a_n$ , separating between element with a whitespace.

#### Output

The output consists of two lines:

First Line	An integer $m$ which is the number of elements in the set.
Second Line	A sequence of the elements in set

#### Example of input and output

Input	Output
20 4 5 5 6 7 8 8 9 9 9 9 9 10 10 11 19 20 25 25 30	12 4 5 6 7 8 9 10 11 19 20 25 30
1 1	1 1
5 -5 -5 -5 -5 -5	1 -5

### Problem #2 | The foundation of set

There are basically four operations between sets. That are, Union, Intersection, Difference and Complement. You can look for definition and differences of these four operations between sets from <https://www.geeksforgeeks.org/set-operations/>

Since playing around with these operations requires “Universe”, the universe in this problem will be integers ranging from  $m$  to  $n$ , inclusively.

Your task is to implement these basic operations between two arrays in the given universe. If the given array is not a set, convert it into a set. If the operation results in an empty set, print “empty”

#### Input

The input consists of five lines:

First Line	Two integers $m, n$ in which $-10,000 \leq m < n \leq 10,000$ as the range of the universe
Second Line	An integer $p$ in which $0 \leq p \leq 100$ , stating the number of elements in an array $A$
Third Line	A sequence of non-decreasing order array $A$ of integer $a_1 a_2 \dots a_p$ separating between element with a whitespace.
Fourth Line	An integer $q$ in which $0 \leq q \leq 100$ , stating the number of elements in an array $B$
Fifth Line	A sequence of non-decreasing order array $B$ of integer $b_1 b_2 \dots b_q$ separating between element with a whitespace.

#### Output

The output consists of eight lines:

First Line	The set $SA$ which is equivalent to array $A$ and is a subset of universe
Second Line	The set $SB$ which is equivalent to array $B$ and is a subset of universe
Third Line	The result from applying “Union” $(SA \cup SB)$
Fourth Line	The result from applying “Intersection” $(SA \cap SB)$
Fifth Line	The result from applying “Difference” $(SA - SB)$
Sixth Line	The result from applying “Difference” $(SB - SA)$
Seventh Line	The result from applying “Complement” $(SA)'$
Eighth Line	The result from applying “Complement” $(SB)'$

## Examples of input and output

Input	Output
10 20 7 12 12 13 15 19 20 20 9 11 11 11 12 12 13 16 17 18	12 13 15 19 20 11 12 13 16 17 18 11 12 13 15 16 17 18 19 20 12 13 15 19 20 11 16 17 18 10 11 14 16 17 18 10 14 15 19 20
12 23 4 13 29 45 90 1 3	13 empty 13 empty 13 empty 12 14 15 16 17 18 19 20 21 22 23 12 13 14 15 16 17 18 19 20 21 22 23
-2 15 0 0	empty empty empty empty empty empty -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15