Quicksort 1 - Partition

The previous challenges covered Insertion Sort, which is a simple and intuitive sorting algorithm with an average case performance of $O(n^2)$. In these next few challenges, we're covering a *divide-and-conquer* algorithm called Quicksort (also known as *Partition Sort*).

Step 1: Divide
Choose some pivot element, p, and partition your unsorted array, ar, into three smaller arrays: $left$, $right$, and $equal$, where each element in $left < p$, each element in $right > p$, and each element in $equal = p$.

Challenge
Given ar and $p = ar[0]$, partition ar into $left$, $right$, and $equal$ using the *Divide* instructions above. Then print each element in $left$ followed by each element in $equal$, followed by each element in $right$ on a single line. Your output should be space-separated.

Note: There is no need to sort the elements in-place; you can create two lists and stitch them together at the end.

Input Format

The first line contains n (the size of ar).
The second line contains n space-separated integers describing ar (the unsorted array). The first integer (corresponding to $ar[0]$) is your pivot element, p.

Constraints

- $1 \le n \le 1000$
- $-1000 \le x \le 1000, x \in ar$
- All elements will be unique.
- Multiple answer can exists for the given test case. Print any one of them.

Output Format

On a single line, print the partitioned numbers (i.e.: the elements in $left$, then the elements in $equal$, and then the elements in $right$). Each integer should be separated by a single space.

Sample Input

```
5
4 5 3 7 2
```

Sample Output

```
3 2 4 5 7
```

Explanation

$ar = [4, 5, 3, 7, 2]$
Pivot: $p = ar[0] = 4$.
$left = \{\}$; $equal = \{4\}$; $right = \{\}$

$ar[1] = 5 \geq p$, so it's added to $right$.
$left = \{\}$; $equal = \{4\}$; $right = \{5\}$

$ar[2] = 3 < p$, so it's added to $left$.
$left = \{3\}$; $equal = \{4\}$; $right = \{5\}$

$ar[3] = 7 \geq p$, so it's added to $right$.
$left = \{3\}$; $equal = \{4\}$; $right = \{5, 7\}$

$ar[4] = 2 < p$, so it's added to $left$.
$left = \{3, 2\}$; $equal = \{4\}$; $right = \{5, 7\}$

We then print the elements of $left$, followed by $equal$, followed by $right$, we get: `3 2 4 5 7`.

This example is only one correct answer based on the implementation shown, but it is not the only correct answer (e.g.: another valid solution would be `2 3 4 5 7`).