

# Insertion Sort - Part 1

## Problem Statement

### Sorting

One common task for computers is to sort data. For example, people might want to see all their files on a computer sorted by size. Since sorting is a simple problem with many different possible solutions, it is often used to introduce the study of algorithms.

### Insertion Sort

These challenges will cover Insertion Sort, a simple and intuitive sorting algorithm. We will first start with an already sorted list.

### Insert element into sorted list

Given a sorted list with an unsorted number  $V$  in the right-most cell, can you write some simple code to insert  $V$  into the array so it remains sorted?

Print the array every time a value is shifted in the array until the array is fully sorted. The goal of this challenge is to follow the correct order of insertion sort.

*Guideline:* You can copy the value of  $V$  to a variable, and consider its cell "empty". Since this leaves an extra cell empty on the right, you can shift everything over until  $V$  can be inserted. This will create a duplicate of each value, but when you reach the right spot, you can replace a value with  $V$ .

### Input Format

There will be two lines of input:

- $s$  - the size of the array
- $ar$  - the sorted array of integers

### Output Format

On each line, output the entire array every time an item is shifted in it.

### Constraints

$$1 \leq s \leq 1000$$

$$-10000 \leq x \leq 10000, x \in ar$$

### Sample Input

```
5
2 4 6 8 3
```

### Sample Output

```
2 4 6 8 8
2 4 6 6 8
2 4 4 6 8
2 3 4 6 8
```

### Explanation

3 is removed from the end of the array.

In the 1<sup>st</sup> line  $8 > 3$ , 8 is shifted one cell right.  
In the 2<sup>nd</sup> line  $6 > 3$ , 6 is shifted one cell right.  
In the 3<sup>rd</sup> line  $4 > 3$ , 4 is shifted one cell right.  
In the 4<sup>th</sup> line  $2 < 3$ , 3 is placed at position 2.

## Task

Complete the method `insertionSort` which takes in 1 parameter:

- *ar* - an array with the value *V* in the right-most cell.

## Next Challenge

In the [next Challenge](#), we will complete the insertion sort itself!