# Exercises: Arrays Advanced

## Train

You will be given an **array of strings**.

The **first** element will be **a string containing wagons** (numbers). Each number inside the string represents **the number of passengers that are currently in a wagon**.

The **second** element in the array will be **the max capacity of each wagon** (single number).

The **rest** of the elements will be **commands** in the following format:

* **Add** {**passengers**} – add a wagon to the end with the given number of passengers.
* {**passengers**} - find an existing wagon to **fit all the passengers** (**starting from the first wagon**)

At the end **print the final state** of the train (all the wagons **separated** by a space)

### Example

|  |  |
| --- | --- |
| **Input** | **Output** |
| ['32 54 21 12 4 0 23',  '75',  'Add 10',  'Add 0',  '30',  '10',  '75'] | 72 54 21 12 4 75 23 10 0 |
| ['0 0 0 10 2 4',  '10',  'Add 10',  '10',  '10',  '10',  '8',  '6'] | 10 10 10 10 10 10 10 |

## Distinct Array

You will be given an **array of integer numbers** on the first line of the input (**space-separated**).

Remove all **repeating elements** from the array.

Print the result elements **separated** by single space.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| [1, 2, 3, 4] | 1 2 3 4 | No repeating elements |
| [7, 8, 9, 7, 2, 3, 4, 1, 2] | 7 8 9 2 3 4 1 | 7 and 2 are already present in the array 🡺remove them |
| [20, 8, 12, 13, 4, 4, 8, 5] | 20 8 12 13 4 5 | 4 and 8 are already present in the array 🡺remove them |

## House Party

Write a function that keeps track of **guests** that are going to a house party.

You will be given an **array of strings**. Each string will be one of the following:

* **"{name} is going!"**
* **"{name} is not going!"**

If you receive the **first type of input**, you have to **add** the person if he/she **is not** in the list (If he/she is in the list print: "**{name} is already in the list!**").

If you receive the **second type of input**, you have to **remove** the person if he/she **is** in the list (if not print: "**{name} is not in the list!**").

At the end print all the guests each on a **separate line**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| ['Allie is going!',  'George is going!',  'John is not going!',  'George is not going!'] | John is not in the list!  Allie |
| ['Tom is going!',  'Annie is going!',  'Tom is going!',  'Garry is going!',  'Jerry is going!'] | Tom is already in the list!  Tom  Annie  Garry  Jerry |

## Sorting

Write a function that sorts an **array of numbers** so that the first element is the **biggest** one, the second is the **smallest** one, the third is the **second** **biggest** one, the fourth is the **second** **smallest** one and so on.

Print the elements on one row, **separated** by single space.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| [1, 21, 3, 52, 69, 63, 31, 2, 18, 94] | 94 1 69 2 63 3 52 18 31 21 |

## Sort an Array by 2 Criteria

Write a function that orders an **array of strings**, by their **length** in **ascending order** as **primary criteria**, and by **alphabetical value** in **ascending order** as **second criteria**. The comparison should be **case-insensitive**.

The **input** comes as **array of strings**.

The **output** is the **ordered** array of strings.

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| ["alpha", "beta", "gamma"] | beta  alpha  gamma |  | ["Isacc", "Theodor", "Jack", "Harrison", "George"] | Jack  Isacc  George  Theodor  Harrison |

### Hints

* An array can be **sorted** by passing a comparing function to the **Array.sort()** function
* Creating a comparing function by 2 criteria can be achieved by first comparing by the **main criteria**, if the 2 items are different (the result of the compare is not 0) - return the result as the result of the comparing function. If the two items are the same by the **main criteria** (the result of the compare is 0), we need to compare by the **second criteria** and the result of that comparison is the result of the comparing function

## Bomb Numbers

Write a function that receives two parameters: **sequence of numbers** and **special bomb number** with a certain **power**.

Your task is to **detonate every occurrence** of the **special bomb number** and according to its power **his neighbors from left and right**. Detonations are performed from **left to right** and all detonated numbers **disappear**.

The input contains two **arrays of numbers**. The first contains the **initial sequence** and the second contains the **special bomb number** and **it's power**.

The output is the **sum of the remaining elements** in the sequence.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| [1, 2, 2, 4, 2, 2, 2, 9],  [4, 2] | 12 | Special number is **4** with power **2**. After detontaion we are left with the sequence [1, 2, 9] with sum 12. |
| [1, 4, 4, 2, 8, 9, 1],  [9, 3] | 5 | Special number is **9** with power **3**. After detontaion we are left with the sequence [1, 4] with sum 5. Since the 9 has only 1 neighbour to the right we **remove just it** (one number instead of 3). |
| [1, 7, 7, 1, 2, 3],  [7, 1] | 6 | Detonations are performed from **left to right**. We could not detonate the second occurance of 7 because its **already destroyed** by the first occurance. The numbers [1, 2, 3] survive. Their sum is 6. |
| [1, 1, 2, 1, 1, 1, 2, 1, 1, 1],  [2, 1] | 4 | The red and yellow numbers disappear in two sequential detonations. The result is the sequence [1, 1, 1, 1]. Sum = 4. |

## Search for a Number

You will receive two **arrays** of **integers**. The second **array** contains exactly **three** **numbers**.

**First** number represents the **number** of **elements** you have to **take** from the first **array** (**starting** from the **first** **one**).

**Second** number represents the **number** of **elements** you have to **delete** from the numbers you took (**starting** from the **first** **one**).

**Third** number is the **number** we **search** in our collection after the manipulations.

**As output print** how many times that **number** occurs in our array in the following format:

**"Number {number} occurs {count} times."**

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| [5, 2, 3, 4, 1, 6],  [5, 2, 3] | "Number 3 occurs 1 times." | First we take **5** **elements** from the array. Delete the first **2 elements**.  Then we search for the **number** **3**. |

## . \*Array Manipulator

Write a function that **receives an array of integers** and **array of string commands** and **executes them over the array**. The commands are as follows:

* **add <index> <element>** – adds element at the specified index (elements right from this position inclusively are shifted to the right).
* **addMany <index> <element 1> <element 2> … <element n>** – adds a set of elements at the specified index.
* **contains <element>** – prints the index of the first occurrence of the specified element (if exists) in the array or **-1** if the element is not found.
* **remove <index>** – removes the element at the specified index.
* **shift <positions>** – **shifts every element** of the array the number of positions **to the** **left** (with rotation).
  + For example, [1, 2, 3, 4, 5] -> shift 2 -> [3, 4, 5, 1, 2]
* **sumPairs** – sums the elements in the array by pairs (first + second, third + fourth, …).
  + For example, [1, 2, 4, 5, 6, 7, 8] -> [3, 9, 13, 8].
* **print** – stop receiving more commands and print the last state of the array.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| [1, 2, 4, 5, 6, 7],  ['add 1 8', 'contains 1', 'contains 3', 'print'] | 0  -1  [ 1, 8, 2, 4, 5, 6, 7 ] |
| [1, 2, 3, 4, 5],  ['addMany 5 9 8 7 6 5', 'contains 15', 'remove 3', 'shift 1', 'print'] | -1  [ 2, 3, 5, 9, 8, 7, 6, 5, 1 ] |

## 9. \*Gladiator Inventory

As a gladiator, Peter has cool Inventory. He loves to buy new equipment. You are given Peter’s inventory with all of his equipment -> strings, separated by whitespace.

You may receive the following commands:

* Buy {equipment}
* Trash {equipment}
* Repair {equipment}
* Upgrade {equipment}-{upgrade}

If you receive **Buy command**, you should **add** the equipment at last position in the inventory, but only if it isn't bought already.

If you receive **Trash command**, **delete** the equipment if it exists.

If you receive **Repair command**, you should **repair** the equipment if it exists and place it on **last position**.

If you receive **Upgrade command**, you should check if the equipment exists and **insert** after it the upgrade in the following format: "**{equipment}:{upgrade}";**

### Input / Consrtaints

You will receive an **array of strings**. Each element of the array is a command.

* In the **first input element,** you will receive Peter's **inventory** – sequence of equipment names, separated by space.

### Output

As output you must print Peter's **inventory**.

### Constraints

* The **command will always be valid.**
* The **equipment** and **Upgrade** will be strings and will contain any character, except **'-'**.
* Allowed working **time** / **memory**: **100ms** / **16MB**.

***Scroll down to see examples.***

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comment** |
| ['SWORD Shield Spear',  'Buy Bag',  'Trash Shield',  'Repair Spear',  'Upgrade SWORD-Steel'] | SWORD SWORD:Steel Bag Spear | We receive the inventory => SWORD, Shield, Spear  We Buy Bag => SWORD, Shield, Spear, Bag  Trash Shield => SWORD, Spear, Bag  Repair Spear => SWORD, Bag, Spear  We add Upgrade => SWORD, SWORD:Steel, Bag, Spear  We print the inventory. |
| ['SWORD Shield Spear',  'Trash Bow',  'Repair Shield',  'Upgrade Helmet-V'] | SWORD Spear Shield |  |

## \*Build a Wall

Write a program that keeps track of the construction of a **30-foot** wall. You will be given an **array of strings** that must be **parsed** as **numbers**, representing the initial height of mile-long sections of the wall, in feet. Each section has its own construction crew that can **add 1** foot of height per day by using 195 cubic yards of concrete. All crews work simultaneously (see examples), meaning all sections that aren't completed (are less than 30 feet high) **grow** by 1 foot every day. When a section of the wall is complete, its crew is relieved.

Your program needs to keep track of how much concrete is used **daily** until the completion of the entire wall. At the end, print on a single line, separated by comma and space, the amount of **concrete** used each **day**, and on a second line, the **final cost** of the wall. One cubic yard of concrete costs **1900** pesos.

### Input

Your program will receive an **array of strings** representing **numbers as a parameter**.

### Output

Print on the console on **one line** the **amount of concrete used each day separated by comma and space**, and on a **second line**, the **final cost** of the wall.

### Constraints

* The wall may contain up to 2000 sections (2000 elements in the initial array)
* Starting height for each section is within range [0…30]

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| [21, 25, 28] | 585, 585, 390, 390, 390, 195, 195, 195, 195  5928000 pesos |

### Explanation

On the first day, all **three** crews work, each adding 1 **foot** to their section, 585 cubic yards total (3 x 195). On the second day, it's the same with the last section reaching 30 feet and its crew being **relieved** (marked in red while they don't work). On the third day, only **two** crews work, using up 390 cubic yards total. This continues for 2 more days, with the second section reaching 30 feet. In the remaining 4 days, only 1 crew works, using 195 cubic yards every day. Over the entire period, 3120 cubic yards of concrete were used, costing 5'928'000 pesos. And that was for just 3 miles, imagine 2000!

|  |  |
| --- | --- |
| **Starting** | **[21, 25, 28]** |
| **Day 1** | **[22, 26, 29]** |
| **Day 2** | **[23, 27, 30]** |
| **Day 3** | **[24, 28, 30]** |
| **Day 4** | **[25, 25, 30]** |
| **Day 5** | **[26, 30, 30]** |
| **Day 6** | **[27, 30, 30]** |
| **Day 7** | **[28, 30, 30]** |
| **Day 8** | **[29, 30, 30]** |
| **Day 9** | **[30, 30, 30]** |

|  |  |
| --- | --- |
| **Input** | **Output** |
| [17] | **195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195**  **4816500 pesos** |

|  |  |
| --- | --- |
| **Input** | **Output** |
| [17, 22, 17, 19, 17] | **975, 975, 975, 975, 975, 975, 975, 975, 780, 780, 780, 585, 585**  **21489000 pesos** |