# Lab: Objects & Composition

Problems for in-class lab for the ["JavaScript Advanced" course @ SoftUni](https://softuni.bg/trainings/3588/js-advanced-january-2022). Submit your solutions in the SoftUni judge system at <https://judge.softuni.bg/Contests/2758/Objects-and-Composition-Lab>.

## City Record

You will receive a city’s **name** (string), **population** (number), and **treasury** (number)as arguments, which you will need to set as **properties** of an **object** and **return** it.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| **'Tortuga',**  **7000,**  **15000** | **{**  **name: 'Tortuga',**  **population: 7000,**  **treasury: 15000**  **}** |
| **'Santo Domingo',**  **12000,**  **23500** | **{**  **name: 'Santo Domingo',**  **population: 12000,**  **treasury: 23500**  **}** |

## Town Population

You have been tasked to create a registry for different **towns** and their **population**.

### Input

The **input** comes as array of strings. Each element will contain data for a town and its population in the following format: "{townName} <-> {townPopulation}"

If you receive the same town twice, **you should add** the **given population** to the **current one**.

### Output

As **output**, you must print all the towns and their population.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| **['Sofia <-> 1200000',**  **'Montana <-> 20000',**  **'New York <-> 10000000',**  **'Washington <-> 2345000',**  **'Las Vegas <-> 1000000']** | **Sofia : 1200000**  **Montana : 20000**  **New York : 10000000**  **Washington : 2345000**  **Las Vegas : 1000000** |
| **['Istanbul <-> 100000',**  **'Honk Kong <-> 2100004',**  **'Jerusalem <-> 2352344',**  **'Mexico City <-> 23401925',**  **'Istanbul <-> 1000']** | **Istanbul : 101000**  **Honk Kong : 2100004**  **Jerusalem : 2352344**  **Mexico City : 23401925** |

## City Taxes

*This task is an extension of Problem 1, you may use your solution from that task as a base.*

You will receive a city’s **name** (string), **population** (number), and **treasury** (number)as arguments, which you will need to set as **properties** of an **object** and **return** it. In addition to the input parameters, the object must have a property taxRate with an initial value of **10**, and three **methods** for managing the city:

* collectTaxes() **-** Increase **treasury** by population \* taxRate
* applyGrowth(percentage) **-** Increase population by **given percentage**
* applyRecession(percentage) **-** Decrease treasury by **given percentage**

Round down the values after each calculation.

### Input

Your solution will receive three **valid** parameters. The methods that expect parameters will be tested with valid input.

### Output

Return an **object** as described above. The methods of the object modify the object and don’t return anything.

|  |  |
| --- | --- |
| **Input** | **Output** |
| **const city =**  **cityTaxes('Tortuga',**  **7000,**  **15000);**  **console.log(city);** | {  name: 'Tortuga',  population: 7000,  treasury: 15000,  taxRate: 10,  collectTaxes: [Function: collectTaxes],  applyGrowth: [Function: applyGrowth],  applyRecession: [Function: applyRecession]  } |
| **Testing with code** | |
| **Input** | **Output** |
| **const city =**  **cityTaxes('Tortuga',**  **7000,**  **15000);**  **city.collectTaxes();**  **console.log(city.treasury);**  **city.applyGrowth(5);**  **console.log(city.population);** | 85000  7350 |

## Object Factory

Create a function that can compose objects by copying functions from a given library of functions. You will receive **two** **parameters** – a **library** of functions as an associative array (object) and an **array of orders**, represented as objects**.** You must **return** a new array – the fulfilled orders.

The **first parameter** will be an object where each property is a **function**. You will use this **library of functions** to compose new objects.

The **second parameter** is an **array of orders**. Each order is an **object** with the following shape:

{

template: [Object],

parts: string[]

}

A **template** is an object that must be **copied**. The **parts array** contains the names of **required functions** as **strings**.

You must **create and return a new array**, by fulfilling all orders from the **orders array**. To fulfill an order, create a copy of the object’s template and then add to it all functions, listed in the **parts array** of the order, by taking them from the **function library** (the first parameter to your solution).

### Input

You will receive two parameters:

* library – an object
* orders – an array of objects

### Output

Your solution must **return an array** of objects.

### Example

|  |
| --- |
| **Input** |
| **const** library **= {**  **print: function () {**  **console.log(`${this.name} is printing a page`);**  **},**  **scan: function () {**  **console.log(`${this.name} is scanning a document`);**  **},**  **play: function (artist, track) {**  **console.log(`${this.name} is playing '${track}' by ${artist}`);**  **},**  **};**  **const** orders **= [**  **{**  **template: { name: 'ACME Printer'},**  **parts: ['print']**  **},**  **{**  **template: { name: 'Initech Scanner'},**  **parts: ['scan']**  **},**  **{**  **template: { name: 'ComTron Copier'},**  **parts: ['scan', 'print']**  **},**  **{**  **template: { name: 'BoomBox Stereo'},**  **parts: ['play']**  **}**  **];**  **const products = factory(**library**,** orders**);**  **console.log(products);** |
| **Output** |
| **[**  **{**  **name: 'ACME Printer',**  **print: [Function: print]**  **},**  **{**  **name: 'Initech Scanner',**  **scan: [Function: scan]**  **},**  **{**  **name: 'ComTron Copier',**  **scan: [Function: scan],**  **print: [Function: print]**  **},**  **{**  **name: 'BoomBox Stereo',**  **play: [Function: play]**  **}**  **]** |

## Assembly Line

Create a function that **returns** a **library of decorator functions**. They can be used to **compose** different functionality in a **car object** that they receive as an argument.

Your solution must **return an object**, containing **three decorator functions**:

hasClima – compose air conditioning controls into the passed-in object. This function takes an **object as a parameter** and adds to it the following properties:

* temp – **number** with default value **21**;
* tempSettings – **number** with default value **21**;
* adjustTemp – **function** which takes **no arguments**. If temp is less than tempSettings, this function adds 1 to temp. If temp is more than tempSettings, it decreases temp by 1. If temp and tempSettings are equal, the function does nothing.

hasAudio – compose audio player functionality into the passed-in object. This function takes an **object as a parameter** and adds to it the following properties:

* currentTrack – **object** with properties name (string) and artist (string). The default value is null;
* nowPlaying – **function**, which **prints** on the console the text:

`Now playing '${currentTrack.name}' by ${currentTrack.artist}` , where name and artist are properties of the currentTrack object. If currentTrack is null, this function does nothing.

hasParktronic – compose parking aid functionality into the passed in object. This function takes an **object as a parameter** and adds to it the following properties:

* checkDistance – **function**, which takes a **single argument** distance (number) and **prints** a message on the console, depending on its value:

distance < 0.1 – "Beep! Beep! Beep!"

0.1 <= distance < 0.25 – "Beep! Beep!"

0.25 <= distance < 0.5 – "Beep!"

In any other case, print an **empty string**.

### Input

Your **solution** will receive **no arguments**. All the methods in the returned library must take an **object as an argument**. Any methods that you compose into this object must meet the input requirements listed in the description above.

### Output

Your **solution** must **return an object** containing the **three decorators** described above.

### Example

|  |  |
| --- | --- |
| **Setup** | |
| **const** assemblyLine **= createAssemblyLine();**  **const** myCar **= {**  **make: 'Toyota',**  **model: 'Avensis'**  **};** | |
| **Input** | **Output** |
| assemblyLine**.hasClima(**myCar**);**  **console.log(**myCar**.temp);**  myCar**.tempSettings = 18;**  myCar**.adjustTemp();**  **console.log(**myCar**.temp);** | **21**  **20** |
| **Input** | **Output** |
| assemblyLine**.hasAudio(**myCar**);**  myCar**.currentTrack = {**  **name: 'Never Gonna Give You Up',**  **artist: 'Rick Astley'**  **};**  myCar**.nowPlaying();** | **Now playing 'Never Gonna Give You Up' by Rick Astley** |
| **Input** | **Output** |
| assemblyLine**.hasParktronic(**myCar**);**  myCar**.checkDistance(0.4);**  myCar**.checkDistance(0.2);** | **Beep!**  **Beep! Beep!** |
| **Input** | **Output** |
| **console.log(**myCar**);** | **{**  **make: 'Toyota',**  **model: 'Avensis',**  **temp: 20,**  **tempSettings: 18,**  **adjustTemp: [Function],**  **currentTrack: {**  **name: 'Never Gonna Give You Up',**  **artist: 'Rick Astley'**  **},**  **nowPlaying: [Function],**  **checkDistance: [Function]**  **}** |

## From JSON to HTML Table

You’re tasked with creating an HTML table of students and their scores. You will receive a single string representing an **array of objects**, the **table’s headings** should be equal to the **object’s keys**, while **each object’s values** should be a **new entry** in the table. Any **text values** in an object should be **escaped**, to avoid introducing dangerous code into the HTML.

### Input

The **input** comes with a **single string argument** (the array of objects).

### Output

The **output** should be printed on the console – for each **entry** **row** in the input print the **object** **representing** **it**.

### Note:

Objects’ **keys** will always be the **same.** Check more information for the **HTML Entity [here](https://developer.mozilla.org/en-US/docs/Glossary/Entity).**

### HTML

You are provided with an HTML file to test your table in the browser.

|  |
| --- |
| index.html |
| <!DOCTYPE **html**> <**html lang="en"**> <**head**>  <**meta charset="UTF-8"**>  <**title**>FromJSONToHTMLTable</**title**>  <**style**>  **table**,**th**{  **border**: **groove**;  **border-collapse**: **collapse**;  }  **td**{  **border**: 1**px solid black**;  }  **td**,**th**{  **padding**: 5**px**;  }  </**style**> </**head**> <**body**>  <**div id="wrapper"**>  </**div**>  <**script**>  **function** *fromJSONToHTMLTable*(input){  *//Write your code here* }  **window**.onload = **function**(){  **let** container = **document**.getElementById(**'wrapper'**);  container.**innerHTML** = *fromJSONToHTMLTable*([**'[{"Name":"Stamat","Price":5.5},{"Name":"Rumen","Price":6}]'**]);  };  </**script**> </**body**> </**html**> |

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| `[{"Name":"Stamat",  "Score":5.5},  {"Name":"Rumen",  "Score":6}]` | <table>  <tr><th>Name</th><th>Score</th></tr>  <tr><td>Stamat</td><td>5.5</td></tr>  <tr><td>Rumen</td><td>6</td></tr>  </table> |
| `[{"Name":"Pesho",  "Score":4,  " Grade":8},  {"Name":"Gosho",  "Score":5,  " Grade":8},  {"Name":"Angel",  "Score":5.50,  " Grade":10}]` | <table>  <tr><th>Name</th><th>Score</th><th>Grade</th></tr>  <tr><td>Pesho</td><td>4</td><td>8</td></tr>  <tr><td>Gosho</td><td>5</td><td>8</td></tr>  <tr><td>Angel</td><td>5.5</td><td>10</td></tr>  </table> |