**Lab: Objects & Composition**

Problems for in-class lab for the [" HYPERLINK "https://softuni.bg/trainings/3588/js-advanced-january-2022"JavaScript HYPERLINK "https://softuni.bg/trainings/3588/js-advanced-january-2022"Advanced" course @ HYPERLINK "https://softuni.bg/trainings/3588/js-advanced-january-2022"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> |