# Exercise: Unit Testing and Modules

Problems for exercises and homework for the ["JavaScript Advanced" course @ SoftUni](https://softuni.bg/courses/js-advanced). Submit your solutions in the SoftUni judge system at <https://judge.softuni.bg/Contests/1532>

# Error Handling

## Request Validator

Write a function that **validates** an HTTP request object. The object has the properties method, uri, version and message. Your function will receive **the object as a parameter** and has to **verify** that **each property** meets the following **requirements**:

* method - can be GET, POST, DELETE or CONNECT
* uri - must be a valid resource address or an asterisk (\*); a resource address is a combination of alphanumeric characters and periods; all letters are Latin; the URI **cannot** be an empty string
* version - can be HTTP/0.9, HTTP/1.0, HTTP/1.1 or HTTP/2.0 supplied as a string
* message - may contain **any number** or non-special characters;special characters are <, >, \, &, ', "

If a request is **valid**, return it **unchanged**.

If any part **fails** the check, throw an Error with message "Invalid request header: Invalid {Method/URI/Version/Message}".

Replace the part in curly braces with the relevant word. Note that some of the **properties may be missing**, in which case the request is **invalid**. Check the properties **in the order** in which they are listed above. If **more than** one property is **invalid**, throw an error for the **first** encountered.

### Input / Output

Your function will receive an object as a parameter. Return the same object or throw an Error as described above as an output.

### Examples

|  |  |
| --- | --- |
| Input | Output |
| {  method: 'GET',  uri: 'svn.public.catalog',  version: 'HTTP/1.1',  message: ''  } | {  method: 'GET',  uri: 'svn.public.catalog',  version: 'HTTP/1.1',  message: ''  } |
| {  method: 'OPTIONS',  uri: 'git.master',  version: 'HTTP/1.1',  message: '-recursive'  } | Invalid request header: Invalid Method |

|  |  |
| --- | --- |
| {  method: 'POST',  uri: 'home.bash',  message: 'rm -rf /\*'  } | Invalid request header: Invalid Version |

### Hints

Since validating some of the fields may require the use of RegExp, you can check your expressions using the following samples:

|  |  |
| --- | --- |
| URI | |
| Valid | Invalid |
| svn.public.catalog  git.master  version1.0  for..of  .babelrc  c | %appdata%  apt-get    home$  define apps  "documents" |

* Note that the URI **cannot** be an **empty string**.

|  |  |
| --- | --- |
| Message | |
| Valid | Invalid |
| -recursive  rm -rf /\*  hello world  https://svn.myservice.com/downloads/  %root% | <script>alert("xss vulnerable")</script>  \r\n  &copy;  "value"  '; DROP TABLE |

* Note that the message **may** be an **empty string**, but the property must still be present.

# Unit Testing

You are required to **submit only the unit tests** for the object/function you are testing.

## Even or Odd

You need to write unit tests for a function isOddOrEven() that checks whether the length of a passed in string is **even** or **odd**.

If the passed parameter is **NOT** a string return undefined. If the parameter is a string return either **"**even**"** or **"**odd**"** based on the length of the string.

### JS Code

You are provided with an implementation of the isOddOrEven() function:

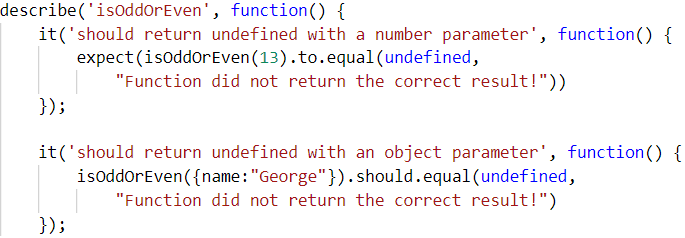
|  |
| --- |
| isOddOrEven.js |
| **function** *isOddOrEven*(string) {  **if** (**typeof**(string) !== **'string'**) {  **return undefined**;  }  **if** (string.**length** % 2 === 0) {  **return "even"**;  }   **return "odd"**; } |

### Hints

We can clearly see there are three outcomes for the function:

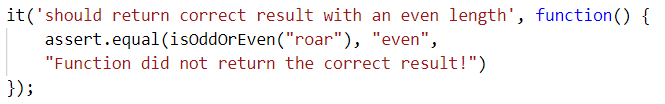
* Returning undefined
* Returning **"**even**"**
* Returning **"**odd**"**

Write one or two tests passing parameters that are **NOT** of type string to the function and expecting it to return undefined.

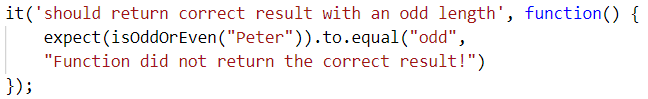


After we have checked the validation it's time to check whether the function works correctly with valid arguments. Write a test for each of the cases:

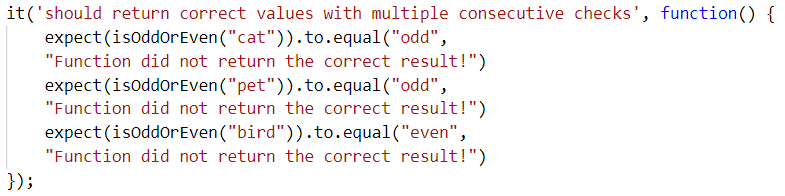
One where we pass a string with **even** length:



And one where we pass a string with an **odd** length:



Finally make an extra test passing **multiple different strings** in a row to ensure the function works correctly:



## Char Lookup

Write unit tests for a function that **retrieves a character** at a given **index** from a passed in **string**.

You are given a function named lookupChar(), which has the following functionality:

* lookupChar(string, index)- accepts a string and an integer (the **index** of the char we want to lookup) :
  + If the **first parameter** is **NOT a string** or the **second parameter** is **NOT a number** - return undefined.
  + If **both parameters** are of the **correct type** but the value of the **index is incorrect** (bigger than or equal to the string length or a negative number) - return **"**Incorrect index**"**.
  + If **both parameters** have **correct types** and **values** - return the character at the specified index in the string.

### JS Code

You are provided with an implementation of the lookupChar() function:

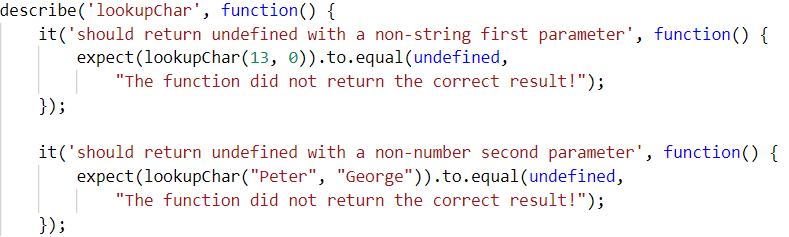
|  |
| --- |
| charLookUp.js |
| **function** *lookupChar*(string, index) {  **if** (**typeof**(string) !== **'string'** || !Number.isInteger(index)) {  **return undefined**;  }  **if** (string.**length** <= index || index < 0) {  **return "Incorrect index"**;  }   **return** string.charAt(index); } |

### Hints

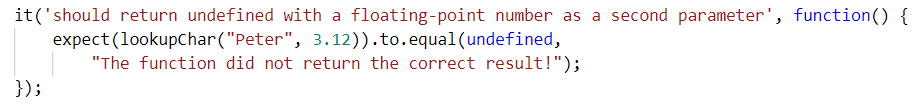
А good first step in testing a method is usually to determine all exit conditions. Reading through the specification or taking a look at the implementation we can easily determine **3 main exit conditions**:

* Returning undefined
* Returning anempty string
* Returning the char at the specified index

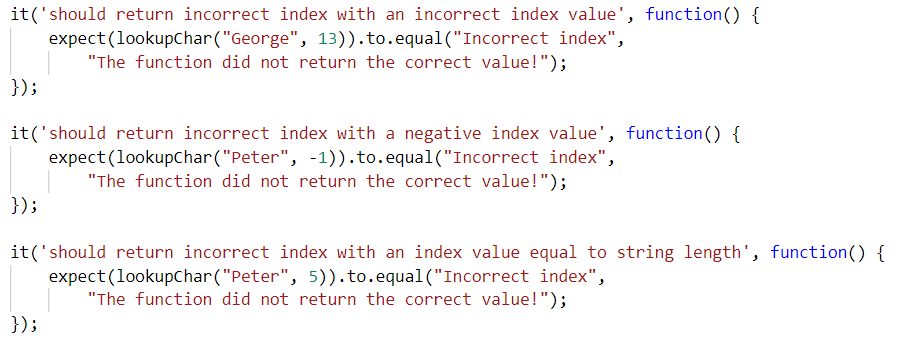
Now that we have our exit conditions we should start checking in what situations we can reach them. If any of the parameters are of **incorrect type**, undefinedshould be returned.



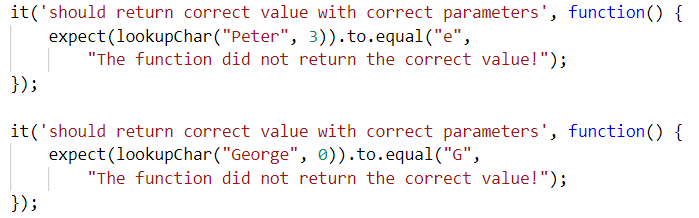
If we take a closer look at the implementation, we see that the check uses Number.isInteger() instead of typeof(index === number) to check the index. While typeof would protect us from getting passed an index that is a non-number, it won’t protect us from being passed a floating-point number. The specification says that **index** needs to be an **integer**, since floating point numbers won’t work as indexes.



Moving on to the next **exit condition** - returning an **empty string** if we get passed an index that is a **negative number** or an index which is **outside of the bounds** of the string.



For the last exit condition - **returning a correct result**. A simple check for the returned value will be enough.

  
With these last two tests we have covered the lookupChar() function.

## Math Enforcer

Your task is to test an object named mathEnforcer, which should have the following functionality:

* addFive(num) - A function that accepts a **single** parameter:
  + If the **parameter** is **NOT a number**, the funtion should return undefined.
  + If the **parameter** is a **number**, **add 5** to it, and return the result.
* subtractTen(num) - A function that accepts a **single** parameter:
  + If the **parameter** is **NOT a number**, the function should return undefined.
  + If the **parameter** is a **number**, **subtract 10** from it, and **return the result**.
* sum(num1, num2) - A function that accepts **two** parameters:
  + If **any** of the 2 parameters is **NOT a number**, the function should return undefined.
  + If **both** parameters are **numbers**, the function should **return their** **sum**.

### JS Code

You are provided with an implementation of the mathEnforcer object:

|  |
| --- |
| mathEnforcer.js |
| **let** mathEnforcer = {  addFive: **function** (num) {  **if** (**typeof**(num) !== **'number'**) {  **return undefined**;  }  **return** num + 5;  },  subtractTen: **function** (num) {  **if** (**typeof**(num) !== **'number'**) {  **return undefined**;  }  **return** num - 10;  },  sum: **function** (num1, num2) {  **if** (**typeof**(num1) !== **'number'** || **typeof**(num2) !== **'number'**) {  **return undefined**;  }  **return** num1 + num2;  } }; |

The methods should function correctly for **positive**, **negative** and **floating-point** numbers. In case of **floating-point** numbers the result should be considered correct if it is **within 0.01** of the correct value.

### Screenshots

When testing a **more complex** object write a nested describe for each function:



Your tests will be supplied with a variable named **"**mathEnforcer**"** which contains the mentioned above logic. All test cases you write should reference this variable.

### Hints

* Test how the program behaves when passing in **negative** values.
* Test the program with floating-point numbers (use Chai’s closeTo() method to compare floating-point numbers).