# Homework: JavaScript Syntax

This document defines the homework assignments from the [“JavaScript Basics“ Course @ Software University](http://softuni.bg/courses/javascript-basics/). Please submit as homework a single zip / rar / 7z archive holding the solutions (source code) of all below described problems.

## Quadratic equation

Write a script that enters the coefficients a, b and c of a quadratic equation **a\*x2 + b\*x + c = 0** and calculates and prints its real roots. Note that quadratic equations may have 0, 1 or 2 real roots. Example:

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  5  -3 | X1 = -3  X2 = 0.5 |
| 2  -4  2 | X = 1 |
| 4  2  1 | No real rots |

## Calculate knots

Write a JavaScript function that accepts a number variable to convert from **km/h** to **knots** (knot is a maritime unit measuring speed). The result should be printed on the console, rounded up to the second sign after the decimal point. Run the program through **Node.js**. Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| 20 | 10.80 |
| 112 | 60.48 |
| 400 | 215.98 |

***Hint:*** Use the link: <http://www.convertunits.com/from/km/h/to/knots>.

## Cylinder Volume

Write a JavaScript function **calcCylinderVol(arr)** that accepts the following parameters: **radius** and the **height** of a **straight circular cylinder**. The function calculates the volume of the cylinder. Write JS program **cylinderVol.js** that calculates the volume of a few cylinders. The result should be printed on the console. Run the program through **Node.js**. Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| [2, 4] | 50.265 |
| [5, 8] | 628.319 |
| [12, 3] | 1357.168 |

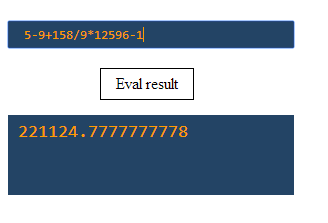
## The Lifetime Supply Calculator

Write a JavaScript function **calcSupply(age, maxAge, food, foodPerDay)** that accepts the following parameters: **your age** (years), **your maximum age** (years), your **favorite food name** (e.g. "chocolate"), **estimate amount of your favorite food per day** (a number).The functioncalculates how many of the food you will eat for the rest of your life. Write JS program **lifetimeSupplyCalc.js** that calculates the amount of a few foods that you will eat. The result should be printed on the console. Run the program through **Node.js**. *Note: we assume that there are no leap years.* Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| 38  118  chocolate  0.5 | 14600kg of chocolate would be enough until I am 118 years old. |
| 20  87  fruits  2 | 48910kg of fruits would be enough until I am 87 years old. |
| 16  102  nuts  1.1 | 34529kg of nuts would be enough until I am 102 years old. |

## \*Calculate Expression

Write a **HTML page** (with **text field**, **button**, and **paragraph**). Write JS program **calcExpression.js** that **calculates** any expression put in the text field and **prints** it in the paragraph. Link the JS file to the HTML file. Example:



# Exam Problems

All problems below are given from the JavaScript Basics exam from **27-July-2014**. You can submit your solutions [here](http://judge.softuni.bg/Contests/19/JavaScript-Basics-Exam-27-July-2014). **You are not obligated** to submit any of them in your homework, but it is highly recommend that you solve some or all of them so you can be well prepared for the upcoming exam. You may read [this post](https://softuni.bg/forum/questions/details/1627) to see how to submit JS code in the Judge system.

## \*Build a Table

Write a JavaScript function that takes as input an array of two numbers (**start** and **end**) and prints at the console a HTML table of 3 columns. The first column should hold a number **num**, changing from **start** to **end**. The second column should hold **num\*num**. The third column should hold "**yes**" if **num** is Fibonacci number or "**no**" otherwise. The table should have header cells titled "**Num**", "**Square**" and "**Fib**". See the below examples.

### Input

The input data comes as **array of two numbers**: **start** and **end**. The input data will always be valid and in the format described. There is no need to check it explicitly.

### Output

Print at the console the above described **table** in the same format like the examples below. Don't add additional spaces. **Whitespace** and character **casing** are important, so please use the same as in the below examples.

### Constraints

* The input is passed to the first JavaScript function found in your code as array of 2 elements.
* The numbers **start** and **end** are positive integers in the range [1…1 000 000] and **start** ≤ **end**.
* Allowed working time for your program: 0.2 seconds.
* Allowed memory: 16 MB.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  6 | <table>  <tr><th>Num</th><th>Square</th><th>Fib</th></tr>  <tr><td>2</td><td>4</td><td>yes</td></tr>  <tr><td>3</td><td>9</td><td>yes</td></tr>  <tr><td>4</td><td>16</td><td>no</td></tr>  <tr><td>5</td><td>25</td><td>yes</td></tr>  <tr><td>6</td><td>36</td><td>no</td></tr>  </table> |
| **Input** | **Output** |
| 55  56 | <table>  <tr><th>Num</th><th>Square</th><th>Fib</th></tr>  <tr><td>55</td><td>3025</td><td>yes</td></tr>  <tr><td>56</td><td>3136</td><td>no</td></tr>  </table> |

## \*Reveal Triangles

You are given a sequence of **text lines**, holding small Latin letters. Your task is to **reveal all triangles** in the text by changing their letters with '**\***'. Triangles consist of equal letters in the form of triangle:

|  |  |  |  |
| --- | --- | --- | --- |
| a  aaa | x  xxx  xxxxx | p  ppp  ppppp  ppppppp | etc. |

Triangles can span **different sizes**: 2 lines, 3 lines, 4 lines, etc. Triangles can **overlap** (some letters can take part in several triangles).

### Input

The input data comes as **array of strings**, holding the text lines.

### Output

Print at the console the input data after replacing all triangles by '**\***'.

### Constraints

* The input will be passed to the first JavaScript function found in your code as **array of strings**.
* Each input line will hold 1…100 Latin letters.
* The number of input lines will be in the range [1..100].
* Allowed working time: 0.2 seconds. Allowed memory: 16 MB.

### Examples

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| a**b**cde**x**gh  **bbb**d**xxx**h  abc**xxxxx** | a\*cde\*gh  \*\*\*d\*\*\*h  abc\*\*\*\*\* | a**a**  **aaa**  **aaaa**  **aaaaa** | a\*  \*\*\*  \*\*\*\*  \*\*\*\*\* | a**x**  **xxx**  b  b**bb**  **bbbb** | a\*  \*\*\*  b  b\*\*  \*\*\*\* | d**ff**dsgy**e**fg  **ffff**ey**eee**  jb**fff**ays  dag**fff**dsss  dfdf**a**  dad**aaa**dddf  sd**aaaaa**  d**aaaaaaa**sf | d\*\*dsgy\*fg  \*\*\*\*ey\*\*\*  jb\*\*\*ays  dag\*\*\*dsss  dfdf\*  dad\*\*\*dddf  sd\*\*\*\*\*  d\*\*\*\*\*\*\*sf |

Hint: to simplify your work, you can reveal only triangles of size "2 lines", because all bigger triangles consist of several overlapping triangles of size "2 lines".

## \*Extract Hyperlinks

Write a JavaScript function to **extract all hyperlinks** (**<href=…>**) from given text. The text comes as **array of strings**, passed as parameter to your function. Print at the console the **href** values in the text.

The input text is **standard HTML code**. It may hold many tags and can be formatted in many different forms (with or without whitespace). The **<a>** elements may have many attributes, not only **href**. You should extract only the values of the **href** attributes of all **<a>** elements.

### Input

The input data comes as **array of strings**, holding the text lines.

### Output

Print at the console the **href** values in the text, each at a separate line, in the order they come from the input.

### Constraints

* The input will be passed to the first JavaScript function found in your code as **array of strings**.
* The input will be **well formed HTML fragment** (all tags and attributes will be correctly closed).
* Attribute values will never hold tags and hyperlinks, e.g. "**<img alt='<a href="hello">' />**" is invalid.
* Commented links are also extracted.
* The number of input lines will be in the range [1..100].
* Allowed working time: 0.2 seconds. Allowed memory: 16 MB.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| <a href="http://softuni.bg" class="new"></a> | http://softuni.bg |
| <p>This text has no links</p> |  |
| <!DOCTYPE html>  <html>  <head>  <title>Hyperlinks</title>  <link href="theme.css" rel="stylesheet" />  </head>  <body>  <ul><li><a **href="/"** id="home">Home</a></li><li><a  class="selected" **href=/courses**>Courses</a>  </li><li><a **href =**  **'/forum'** >Forum</a></li><li><a class="href"  onclick="go()" **href= "#"**>Forum</a></li>  <li><a id="js" **href =**  **"javascript:alert('hi yo')"** class="new">click</a></li>  <li><a id='nakov' **href =**  **http://www.nakov.com** class='new'>nak</a></li></ul>  <a **href="#empty"**></a>  <a id="href">href='fake'<img src='http://abv.bg/i.gif'  alt='abv'/></a><a **href="#"**>&lt;a href='hello'&gt;</a>  <!-- This code is commented:  <a href="#commented">commentex hyperlink</a> -->  </body> | /  /courses  /forum  #  javascript:alert('hi')  http://www.nakov.com  #empty  #  #commented |

## \*Concerts

You are given a **timetable** for the upcoming rock concerts. It consists of **bands**, **towns**, **dates** and **venues**, separated by '**|**'. Your task is to write a JavaScript function that prints at the console a **JSON string** that holds the **towns**, **venues** for each town and **list of bands** for each venue (see the example below).

### Input

The input data is passed to the first JavaScript function found in your code as **array of strings**. Each input line holds a concert description: **band**, **town**, **date** (in format **dd-MMM-YYYY**) and **venue**, separated by '**|**'. The input data will always be valid and in the format described. There is no need to check it explicitly.

### Output

Print at the console a **JSON string** that holds the **towns** (in alphabetical order), the **venues** for each town (in alphabetical order) and a **list of bands** for each venue (in alphabetical order). **Duplicates** should be removed (all strings are **case-sensitive**). Please follow exactly the **JSON format** from the example below.

### Constraints

* The numbers of **input lines** is between 1 and 10 000.
* The values **band**, **town** and **venue** consist of Latin letters, spaces and punctuation marks. Their length is between 1 and 300 characters. Leading and trailing **whitespace** should be removed.
* Allowed working time for your program: 0.2 seconds.
* Allowed memory: 16 MB.

### Examples

|  |
| --- |
| **Input** |
| ZZ Top | London | 2-Aug-2014 | Wembley Stadium  Iron Maiden | London | 28-Jul-2014 | Wembley Stadium  Metallica | Sofia | 11-Aug-2014 | Lokomotiv Stadium  Helloween | Sofia | 1-Nov-2014 | Vassil Levski Stadium  Iron Maiden | Sofia | 20-June-2015 | Vassil Levski Stadium  Helloween | Sofia | 30-July-2015 | Vassil Levski Stadium  Iron Maiden | Sofia | 26-Sep-2014 | Lokomotiv Stadium  Helloween | London | 28-Jul-2014 | Wembley Stadium  Twisted Sister | London | 30-Sep-2014 | Wembley Stadium  Metallica | London | 03-Oct-2014 | Olympic Stadium  Iron Maiden | Sofia | 11-Apr-2016 | Lokomotiv Stadium  Iron Maiden | Buenos Aires | 03-Mar-2014 | River Plate Stadium |
| **Output** |
| {"Buenos Aires":{"River Plate Stadium":["Iron Maiden"]},"London":{"Olympic Stadium":["Metallica"],"Wembley Stadium":["Helloween","Iron Maiden","Twisted Sister","ZZ Top"]},"Sofia":{"Lokomotiv Stadium":["Iron Maiden","Metallica"],"Vassil Levski Stadium":["Helloween","Iron Maiden"]}} |
| **Comments** |
| Concerts in Buenos Aires @ River Plate Stadium: Iron Maiden  Concerts in London @ Olympic Stadium: Metallica  Concerts in London @ Wembley Stadium: Helloween, Iron Maiden, Twisted Sister, ZZ Top  Concerts in Sofia @ Lokomotiv Stadium: Iron Maiden, Metallica  Concerts in Sofia @ Vassil Levski Stadium: Helloween, Iron Maiden |