

## JavaScript and DOM

This exercise is not assessed. Attempt as many exercises as you can. If you do not manage to finish all the exercises in the lab, please attempt to finish them in your own time. If you find the first few exercises too easy — skip to the harder ones. Remember, the lab tutors are here to help. If you get stuck — do not be shy, raise your hand and ask for advice. It is also okay to discuss the solutions with your peers (these labs are not assessed!), however, make sure you understand everything by yourself.

Good luck!

1. Check your working environment. All you will need for these exercises is a decent web browser capable of executing JavaScript (e.g. Firefox, Chrome, a recent Internet Explorer), and your favourite text editor.
2. Write an HTML document with a simple JavaScript program in it that would populate the document with the two sentences `"Hello, World! This is my first JavaScript program"`.

Each sentences should start on a new line.

(Hint: see slide 13 of the lecture, but you will need to use a different method to make sure each sentence starts on a new line.)

3. Modify your program from Question 2 in such a way that the `"Hello, World! This is my first JavaScript program"` message is wrapped in a paragraph element `<p>` and is displayed in large red letters, still using the same method to display each sentence on a new line.
4. Modify your program from Question 2 in such a way that when JavaScript is not supported (or disabled) by the browser a different message (`"JavaScript is not enabled."`) is shown. Test this by temporarily disabling JavaScript support in your browser<sup>1</sup>.

(Hint: use the `<noscript>` tag.)

5. Modify your script to only display the first sentence (i.e. `"Hello, World!"`). Then modify your script in such a way so that the `"Hello, World!"` message is printed by a `helloWorld()` function defined inside the `<head>` element of the document. The function should be invoked automatically when the `onLoad` event is triggered.

Hint: Specify the `onLoad` event handler in the initial body tag:

```
<body onLoad="helloWorld()">
```

---

<sup>1</sup>If Firefox, for example, you may need to type `about:config` into the address bar, and then find and toggle the `javascript.enabled` property.

6. Modify your solution to Question 5 in such a way that the "Hello, World!" message is produced by operating on the DOM. Namely, use the `createElement` method of the `document` object to create a paragraph element, use the `document.createTextNode` method to create a text node containing the string "Hello, World!", then use the `appendChild` method of your newly created paragraph object to make this text node its child, and finally make the paragraph a child of the `body`.
7. Modify your solution to Question 6 in such a way that the message appears in large red letters. Do this by manipulating the `your_paragraph.style` object.

Hint: see [http://www.w3schools.com/jsref/dom\\_obj\\_style.asp](http://www.w3schools.com/jsref/dom_obj_style.asp) and [http://www.w3schools.com/jsref/prop\\_style\\_font.asp](http://www.w3schools.com/jsref/prop_style_font.asp)

8. Take any HTML document and equip it with a script that would appropriately handle the `onLoad` event of the `body` element and ask the user their age (using, for example, a pop-up prompt). If the user is under 18, you should then redirect the user to a different page, otherwise continue loading the document.

Hints:

- You can redirect the user to another page by setting `window.location`. See more here: [http://www.w3schools.com/jsref/obj\\_location.asp](http://www.w3schools.com/jsref/obj_location.asp)
- Use `window.prompt` to display a pop-up prompt.  
See more here: [http://www.w3schools.com/jsref/met\\_win\\_prompt.asp](http://www.w3schools.com/jsref/met_win_prompt.asp)
- Use `parseInt(...)` to convert user's input into a number.

9. Write an HTML document containing a single image. Write an appropriate event handler in JavaScript such that when the user moves the mouse over the image, the image jumps to a new randomly chosen position thus escaping the cursor.

Hints:

- You need to handle the `onMouseOver` event.
- To change the position of the image, you will need to modify the properties of the `your_image.style` object. See more here: [http://www.w3schools.com/jsref/dom\\_obj\\_style.asp](http://www.w3schools.com/jsref/dom_obj_style.asp), the `top` and `left` properties. See also the similar example from the lectures.
- To generate a random number, use the `random()` method of the `Math` object. See more here: [http://www.w3schools.com/jsref/jsref\\_obj\\_math.asp](http://www.w3schools.com/jsref/jsref_obj_math.asp). Note that it returns a real number between 0 and 1.
- You may want to set the `style.position` property to "absolute".

10. Ohm's law describes the relationship between voltage ( $V$ ), current ( $I$ ), and resistance ( $R$ ) in an ideal resistive conductor:  $V = IR$ .

Create a form with three input fields: for resistance, voltage, and current. Write a JavaScript function to handle the `onSubmit` event of this form that would simply read the values entered in the form and print them out (for example, by creating new paragraph elements in the document). Note that you do not have to write a server-side script to process the form. Do everything on the client side with JavaScript.

Hints:

- To access form values by their `ids`, use:  
`document.getElementById("some_id").value`
- To avoid submitting the form, return `false` from the `onSubmit` handler.

11. Modify your event handler from Question 10 so that it checks that the user has entered any two of the quantities (and left out the remaining third quantity blank). Display an error message (for example using the `alert` function) if this is not the case.

12. Further modify the event handler to check that the entered values are numbers.

Hints:

- You may come up with a simple solution using operations on strings documented here: [http://www.w3schools.com/jsref/jsref\\_obj\\_string.asp](http://www.w3schools.com/jsref/jsref_obj_string.asp).
- Another good test would be:  

```
function isNumber(val) {  
    return !isNaN(parseFloat(val)) && isFinite(val);  
}
```
- Better still, use regular expressions: see [https://www.w3schools.com/jsref/jsref\\_obj\\_regexp.asp](https://www.w3schools.com/jsref/jsref_obj_regexp.asp)

13. Now modify your event handler to compute the remaining quantity given the two that the user entered, and fill in the blank input field with the answer.



14. To help the user fill in the form in Question 10, write event handlers for `onFocus` and `onBlur` to display help messages when she moves through the form fields.

15. A pizza delivery company allows their customers to choose toppings when they place orders online. The options are: ham, bacon, mushrooms, salami, and pineapple. The pizza company wants to minimise their costs, and they have tasked you with designing the order form in such a way that at most three toppings can be selected at once. Further, pineapple cannot be selected together with salami.

Create a form with five checkboxes for the toppings. Write an appropriate `onClick` event handler(s) for the checkboxes that would enable or disable the other checkboxes appropriately, to satisfy the above conditions, when the user clicks any of the checkboxes. For example, when the user selects their third topping, the remaining two options must be disabled. Similarly, when the user selects salami, the option to select pineapple must become unavailable.

Hint: Set the `disabled` property of the checkbox element to disable it.

---

Useful addresses	
Upload your website to	<a href="http://websites.cs.cf.ac.uk">websites.cs.cf.ac.uk</a>
View your website via	<a href="http://project.cs.cf.ac.uk/mailname">http://project.cs.cf.ac.uk/mailname</a> 
(For this exercise you can work locally, you do not need to upload anything)	
JavaScript/DOM reference	<a href="http://www.w3schools.com/jsref/">http://www.w3schools.com/jsref/</a> 
JavaScript cheat sheets	<a href="#">[1]</a> , <a href="#">[2]</a> , <a href="#">[3]</a> ,
DOM cheat sheet	<a href="#">[4]</a>