# COMS/SE 319: Construction of User Interface
# Spring 2022
# LAB Activity 02 – JavaScript Part 1

**Tasks**
- **Task 1: Play with JavaScript (Getting Started)**
- **Task 2: Play with JavaScript Variables**
- **Task 3: Play with JavaScript Functions**
- **Task 4: Functions as First-Class Objects**
- **Task 5: Closures**
- **Task 6: THIS**

## Task 1:  PLAY WITH JAVASCRIPT (GETTING STARTED)

**Assumptions:**

- You already know HTML basics.
- If not – then browse through quickly

  https://www.w3schools.com/html/default.asp

  HTML is mostly about formatting --- so should be easy to grasp.

**Learning Objectives:**
- **Students will:**
- learn how to embed js in HTML files
- learn how to debug js code on browser
- learn about variable types

**Resource:**

All the links shown in the snapshot below have a wealth of information. Please read first.

About JS in general: https://www.w3schools.com/js/default.asp

About JS variables: https://www.w3schools.com/js/js_variables.asp

**Step 1:**

READ https://www.w3schools.com/js/js_whereto.asp

**Step 2:**

- READ 01_looselyTyped.html (provided inside zip folder)
- Double click on it (should run the file in the browser).
- We will assume you are using Google Chrome.

NOTE: Since the browser can interpret js (i.e. js runs on the client side), we do not need to have a server to play with js.

**Step 3:**

Start the debugger. Click on settings, more tools, and the developer tools (or use the shortcut)
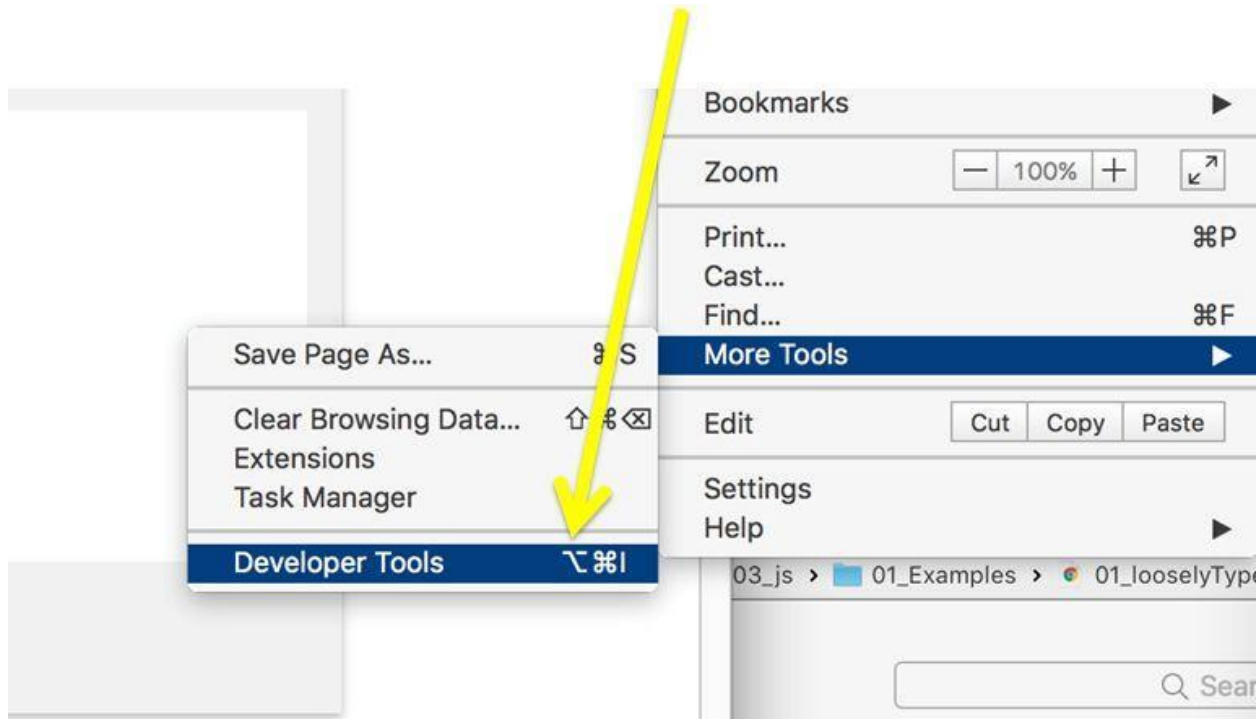


**Step 4:**

Play with the different tabs of the debugger. In particular (Elements, Console, Sources, and Network).

**Step 5:**

- Run the 01_looselyTyped.html (provided) by double-clicking on it.
- Think about the difference between document.write and console.log.
- Think about the different types of data that are demonstrated in this example.
- Think about how to find the type of data item.

**Step 6:**

Run the code in debug mode by

1. inserting a breakpoint (click on line number)
2. refreshing the browser (to reload the program)
3. stepping over a statement.
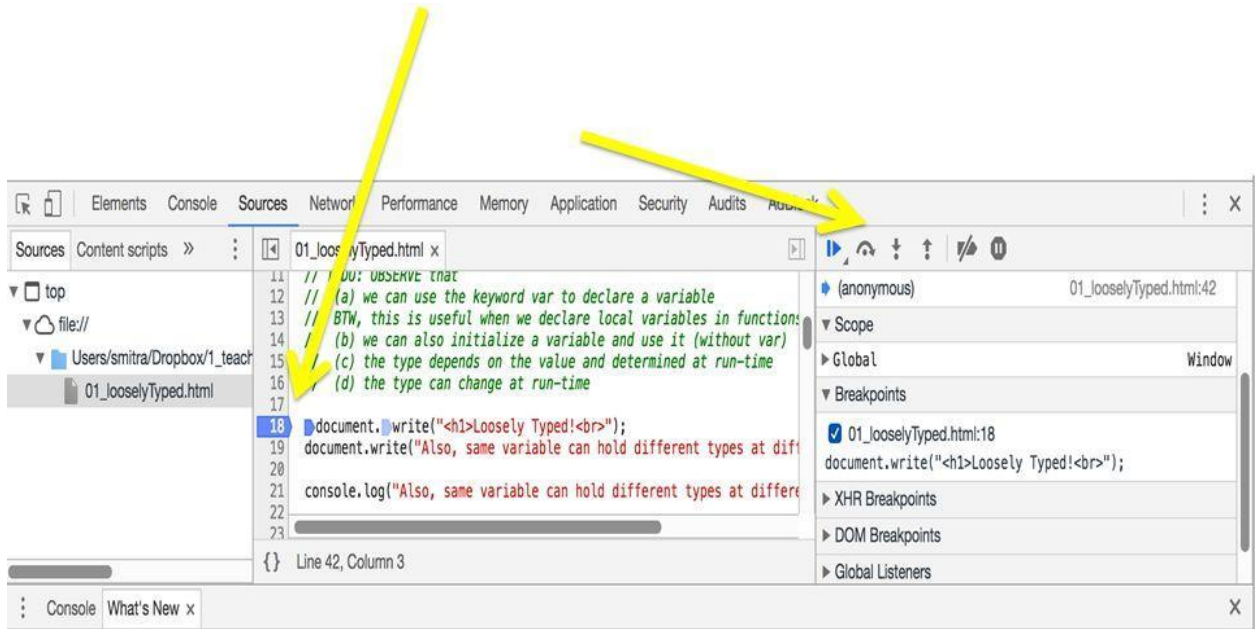


4.

# Task 2: PLAY WITH JAVASCRIPT VARIABLES

**Learning Objectives:**

- **Students will:**
  - learn about var, let, and const

**Resource:**

All the links shown in the snapshot below have a wealth of information. Please read first.

About JS variables: https://www.w3schools.com/js/js_variables.asp

About var, let, and const: http://wesbos.com/javascript-scoping/

More about let and const: http://wesbos.com/let-vs-const/

**Step 1:**

- Read about var, let, and const: http://wesbos.com/javascript-scoping/
- Read more about let and const: http://wesbos.com/let-vs-const/

**Step 2:**
- READ 02_varsDeclarations.html (provided)
- Double click on it (should run the file in the browser).
- What do the following scopes mean?
  - Global
  - Function
  - Block
- How do var, let, and const differ from each other?
- Which one of those keywords below declares a variable in function scope?

**Step 3:**
- READ 03_equality.html(provided)
- Double click on it (should run the file in the browser).
- What is the difference between == and ===?
Note that you can type in JavaScript in the console window and see results!
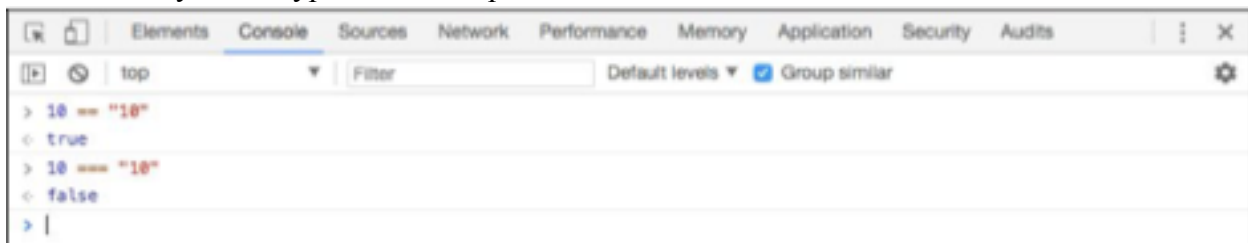


# Task 3: Play with Javascript FUNCTIONS
# Learning Objectives
- Students will:
  1. learn about js functions:
     - function declarations vs function expressions
     - declaration hoisting
     - function names as pointers to function objects

**Resource:**
All the links shown in the snapshot below have a wealth of information. Please read first.
About JS functions: https://www.w3schools.com/js/js_functions.asp

Also, function scope: https://www.w3schools.com/js/js_scope.asp

**Step 1:**

1. Read 04_funcs_declaration.html
2. Run it by double clicking on the file

3. Think about the two ways that functions can be declared.
4. Think about the differences between the two in how they behave.
5. Think about what happens on lines 36 and 37.

## Step 2:

1. READ 05_funcs_hoisting.html (provided)
2. Double click on it (should run the file in the browser).
3. Think about what function declaration hoisting means.

## Step 3:

1. READ 06_funcs_pointers.html (provided)
2. Double click on it (should run the file in the browser).
3. Explain what happens in line 34?
4. Explain what happens on line 48 and why that is different from line 34.

# Task 4: Functions as First-Class Objects

## Learning Objectives:

- learn what is meant by first class objects
- learn that functions are first-class objects in javascript.

## Resource:
https://en.wikipedia.org/wiki/First-class_function
Useful Blog:
https://hackernoon.com/effective-functional-javascript-first-class-and-higher-order-functions-71
3fde8df50a

## Step 1:
READ https://en.wikipedia.org/wiki/First-class_function
When are functions said to be first class objects?

## Step 2:
READ 07_funcs_firstClass.html (provided)
On which line is
**a) a function being assigned to a variable?**
**b) a function being passed as a parameter?**
**c) a function being declared inside a function?**
**d) a function being returned from a function?**

## Step 3:
Double click on 07_funcs_firstClass.html. Make sure you understand the results!

# Task 5: CLOSURES

## Learning Objectives:

- **Students will:**
  **Play with functions in order to see examples of closures.**

## Step 1:

- READ

https://www.w3schools.com/js/js_function_closures.asp

and

http://javascriptissexy.com/understand-javascript-closures-with-ease/

- What is a javascript closure?

## Step 2:

- READ 08_funcs_closures.html (provided)
- READ 09_1_funcs_useOfClosures.html
- READ 09_2_funcs_useOfClosures.html

## Step 3:

- READ 10_0_funcs_closures3.html
- READ 10_1_funcs_closures3.html
- READ 10_2_funcs_closures3.html

**If you uncomment these lines below in 10_2_funcs_closures3.html file, what is the output?**

*//document.write(x[0]() + "<br>");*
*//document.write(x[1]() + "<br>");*

## Step 4:

- READ 11_funcs_closuresReuseCode.html
- Note how we are able to use "higher order functions" (functions that take other functions as parameters) to abstract out common functionality. Makes the codes much easier to write (and read).

## Task 6: THIS

### Learning Objective:

- Students will:
  - learn about simple js objects.
  - understand "this" usage in js

### Step 1:

- READ 12_1_funcs_objectsThis.html
- Run the code (by double-clicking the file) and then explain what happens.

### Step 2:

- READ 13_objectsAsArrays.html
- Run the code (by double-clicking the file) and then explain what happens.

### Step 3:

- Read the SampleProgram (match.js and lab.html).
- Run the code (by double-clicking the HTML) and then explain what happens.

### Step 4:

NOTE that there are some other js files in the folder. You can play with them. As they include some concepts/tools we haven't gone over --- you can also ignore them for now.

**Answer quiz questions on canvas related to this lab**

**There is also an optional Javascript Part 2 lab for learning more about events and prototypes.**

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