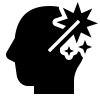
**W1** PRACTICE

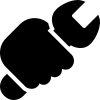
*From C++ to JS*

## At the end of this practice, you can



* Run JS code
* Create **variables** and **constants**
* Call and define **functions**
* Use JS **loops** and **conditions**
* Manipulate **arrays**, **objects**, **strings**, **Boolean** and **numbers**

## Get ready before this practice!



* **Read** the following documents to understand JS syntax:

<https://cstart.mines.edu/web/Day2/2-JavaScriptBasicSyntax.pdf>

<https://www.integral-domain.org/lwilliams/mis462/JavaScript.pdf>

You can also go further with the following books:

<https://www.gurukultti.org/admin/notice/javascript.pdf>

<https://www.w3schools.com/js/default.asp>

* **Complete the quiz** (*you can re-do it until you have 100% score*)

## How to submit this practice?

* **Complete** this document
* Once finished, jointhis documentto the MS Team assignment and **turn it in**

# 3 WAYS TO **RUN JS CODE**

## For beginners

To start with, you can just connect to an **online JavaScript editor**, such as this one:

<https://playcode.io/javascript>

## For front-end ninjas

Chrome or any other **Web Browser** can execute JavaScript code while loading HTML

Just create a simple index.html file, that links to a index.js file:

<!DOCTYPE html>

<html>

<head>

    <title>Let s run JS on a Browser</title>

    <script src='index.js'></script>

</head>

<body>

</body>

</html>

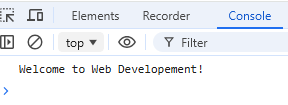
Then just write some JS code, as example here, we print a message on the Browser console

// Example of JS code, printing on console

const courseName = "Web Developement";

console.log("Welcome to " + courseName + "!");

Finally open your index.html on a browser and check the console view



## For back-end gurus

Node.js is also able to **execute JavaScript** code **outside** **a web browser.**

You will need first [to install Node JS](https://nodejs.org/en/download) on your computer.

You can then just open a terminal on the folder containing your index.js file and run

node ./index.js

*PART 1 - UNDERSTAND* ***JS SYNTAX***

*Note: you can use the* [*C++ to JS converter*](https://www.codeconvert.ai/c++-to-javascript-converter) *to compare C++ and JS syntax.*



# EXERCISE 1- TYPES, OUTPUTS

Analyze the differences between the provided C++ and JavaScript code.

|  |  |
| --- | --- |
| **C++** | **JS** |
| #include <iostream>  using namespace std;  int main() {      const int num = 5;      for (int i = 0; i < num; i++) {          cout << i << " ";      }      return 0;  } | const num = 5;  for (let i = 0; i < num; i++) {      console.log(i);  } |

**Q1 -** What does the **const** key word mean in JS code?

**const** key in JS code means that the value that we declare cannot be changed (constant).

**Q2 -** Why is it necessary **to specify the type** of variables in C++ but not in JavaScript?

The type of variable in C++ needs to be specify because it must ensure that the compiler or interpreter knows their type and scope, while JavaScript is a dynamically typed language it means that data types are automatically converted as needed during script execution.

**Q3-** How to **print in the console** in JS?

console.log();

**Q4-** Is there any difference in the **loop syntax** between C++ and JS?

Yes, there are some differences in the loop syntax between C++ and JS such as for C++ we have to declare a variable in loop while in JS we use let instead, and to print the in C++ we use cout while in JS we use console.log();.

# EXERCISE 2 - LOOPS, FUNCTIONS

|  |  |
| --- | --- |
| **C++** | **JS** |
| #include <iostream>  using namespace std;  int calculateSum(int array[], int size) {      int sum = 0;      for (int i = 0; i < size; i++) {        // Add here the calculation logic  sum += (i+1);      }      return sum;  }  int main() {      int arr[] = {1, 2, 3, 4, 5};      cout << calculateSum(arr, 5);      return 0;  } | function calculateSum(array) {      let sum = 0;      for (let i = 0; i < array.length; i++) {         // Add here the calculation logic  sum += (i+1);      }      return sum;  }  let arr = [1, 2, 3, 4, 5];  console.log(calculateSum(arr)); |

**Q1 -** Complete the given codes (see comments) to compute the sum of all elements in an array

**Q2 –** Why the function calculateSum in JS code **does not have the size** parameter?

In JavaScript, functions that operate on arrays do not need a separate size parameter because JavaScript arrays are dynamic and their length can be determined using .length.

# EXERCISE 3 - CONDITIONS, EQUALITY

|  |
| --- |
| **JS** |
| function myFunction(min, max) {    var result = "";    for (let number = min; number <= max; number++) {      if (number % 2 === 0) {        result += number + " - ";      }    }    return result;  } |

**Q1 –** Look at the above code

* Highlight all **variables in blue**
* Underline all **loops in red**
* Highlight all **conditions in green**

**Q2 –** What is the significance of the modulo operator % in these programs?

The modulo operator (%) in programming is used to find the remainder when one number is divided by another.

**Q3 –** What is the difference between === and == in JS? *Highlight the right answer*

|  |  |
| --- | --- |
| 4 == 9 | TRUE / FALSE |
| 4 == 4 | TRUE / FALSE |
| 4 == ‘’4” | TRUE / FALSE |
| 4 === ‘’4” | TRUE / FALSE |

**Q4 –** What will this code will print on console?

console.log(myFunction(9, 14))

10 - 12 - 14 -

**Q5 –** What will this code will print on console?

console.log(myFunction(7, 3))

Undefined

# EXERCISE 4 – MEMORY ALLOCATION

Both codes are performing the same job:

|  |
| --- |
| **C++** |
| #include <iostream>  using namespace std;  int main() {      int size = 5;      int\* arr = new int[size];      for (int i = 0; i < size; i++) {          arr[i] = i \* 2;      }      for (int i = 0; i < size; i++) {          cout << arr[i] << " ";      }      delete[] arr;      return 0;  } |

|  |
| --- |
| **JS** |
| let size = 5;  let arr = [];  for (let i = 0; i < size; i++) {      arr[i] = i \* 2;  }  for (let i = 0; i < size; i++) {      console.log(arr[i]);  } |

**Q1 –** In both codes, are we using a **static** or a **dynamic** array? Explain why…

In the code above it use dynamic array because it starts empty and grows as values are assigned and we can still modify arr after initialization (push(), pop(), etc.).

**Q2 –** Explain why JavaScript **does not** need explicit **memory allocation** or **deallocation**, as C++ need it

In C++, you must manually allocate (new) and deallocate (delete) memory. However, in JavaScript, memory management is automatic due to garbage collection.

*PART 2 - CODE* ***JS CHALLENGES***



Good job!

Now you should know the [basic syntax of JavaScript!](https://www.integral-domain.org/lwilliams/mis462/JavaScript.pdf)

Let’s solve some problem now.

Each challenge is structured the same way:

* **Goal** What the function shall do
* **Inputs**: the function parameters
* **Output** the function return

As example, for the challenge 1, you will provide the following function:

function challenge1(width, height) {

    let rectangleString = '';

    // Your code

    return rectangleString;

}

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 1** | | **EASY** |
| Draw a rectangle in the console using stars | | |
| **INPUT** | **OUTPUT** | |
| width 3  height 4 | \*\*\*  \*\*\*  \*\*\*  \*\*\* | |
| width 5  height 2 | \*\*\*\*\*  \*\*\*\*\* | |
| width 5  height -2 |  | |

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 2** | | **MEDIUM** |
| Reverse an array | | |
| **INPUT** | **OUTPUT** | |
| array [14,15,16,20] | [20,16,15,14] | |
| array [5,4,3,2,1] | [1,2,3,4,5] | |
| array [] | [] | |

Any help on arrays with JavaScript? [Check here](https://www.w3schools.com/jsref/jsref_push.asp).

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 3** | | **MEDIUM** |
| Calculate the average grade of a list of students. | | |
| **INPUT** | **OUTPUT** | |
| array [85, 90, 78, 92] | 86.25 | |
| array [10,20,30] | 20 | |
| array [] | 0 | |

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 4** | | **MEDIUM** |
| Write a function to count how many times a character appears in a string. | | |
| **INPUT** | **OUTPUT** | |
| text "hello world"  char = 'o' | 2 | |
| text "aaa bbb a"  char = 'a' | 4 | |
| text "abc"  char = 'd' | 0 | |

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 5** | | **HARD** |
| Count the number of words in a sentence | | |
| **INPUT** | **OUTPUT** | |
| text "hello world" | 2 | |
| text "this is the best day" | 5 | |
| text "a bb ccc ddddddd e" | 5 | |

|  |  |  |
| --- | --- | --- |
| **CHALLENGE 6** | | **HARD** |
| Simulate a voting system for three candidates (A / B/ C).  Count votes and declare a winner | | |
| **INPUT** | **OUTPUT** | |
| votes [‘A’, ‘B’, ‘A’, ‘C’, ‘A’] | A is the winner | |
| votes [‘A’, ‘B’, ‘B’, ‘C’, ‘A’] | A and B are both winners | |
| votes [] | There is not vote yet | |