BSc in Information Technology
Semester 1

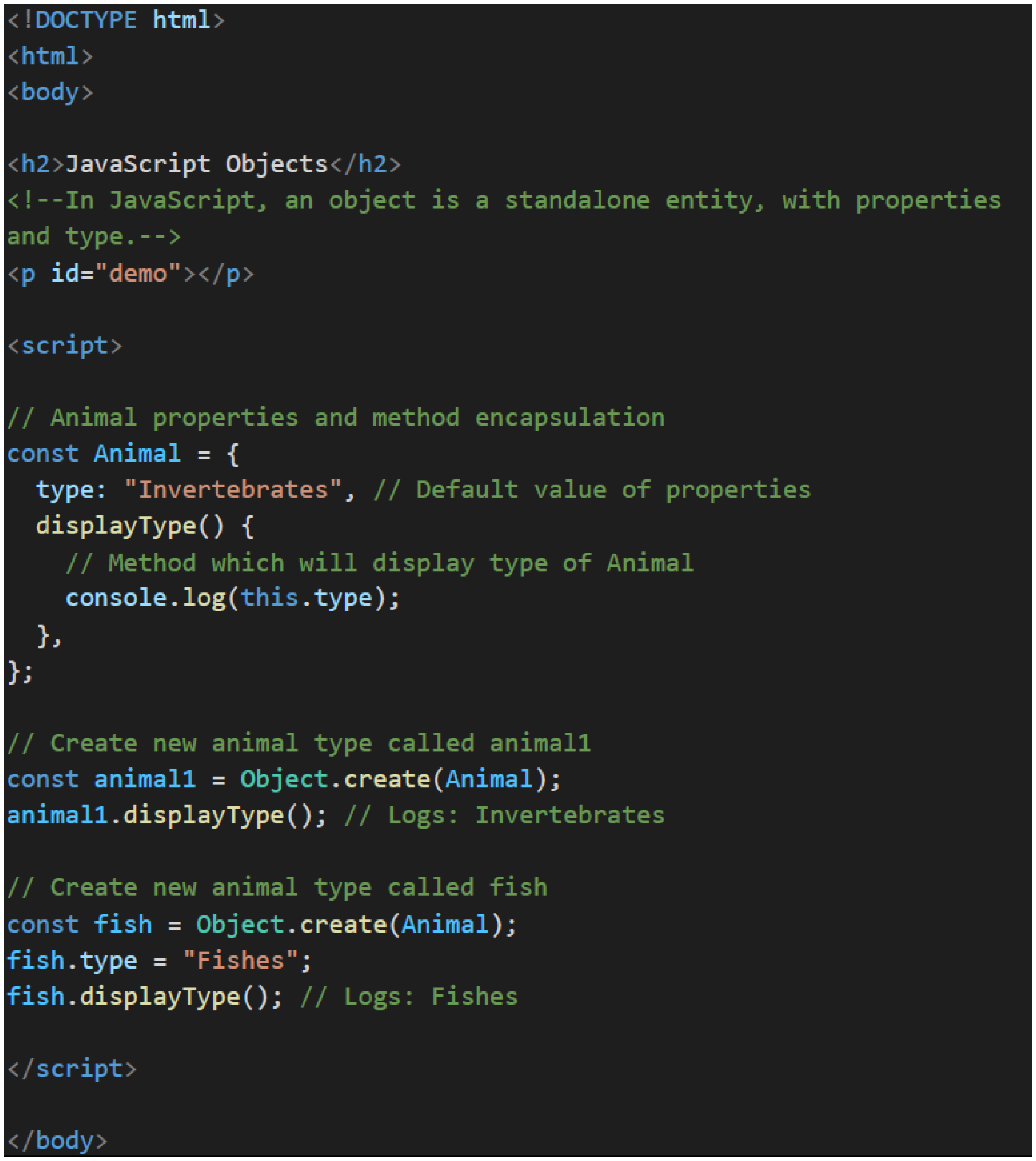
Practical sheet 06 - JavaScript Basics

IT3030 – Programming Applications and Frameworks 2025

JavaScript Basics

- Objective: To teach a set of basic concepts in the JavaScript programming language.
- Prerequisites: Students should have basic JavaScript knowledge.

1. JavaScript Objects



```html
<!DOCTYPE html>
<html>
<body>

<h2>JavaScript Objects</h2>
<!--In JavaScript, an object is a standalone entity, with properties
and type.-->
<p id="demo"></p>

<script>

// Animal properties and method encapsulation
const Animal = {
  type: "Invertebrates", // Default value of properties
  displayType() {
    // Method which will display type of Animal
    console.log(this.type);
  },
};

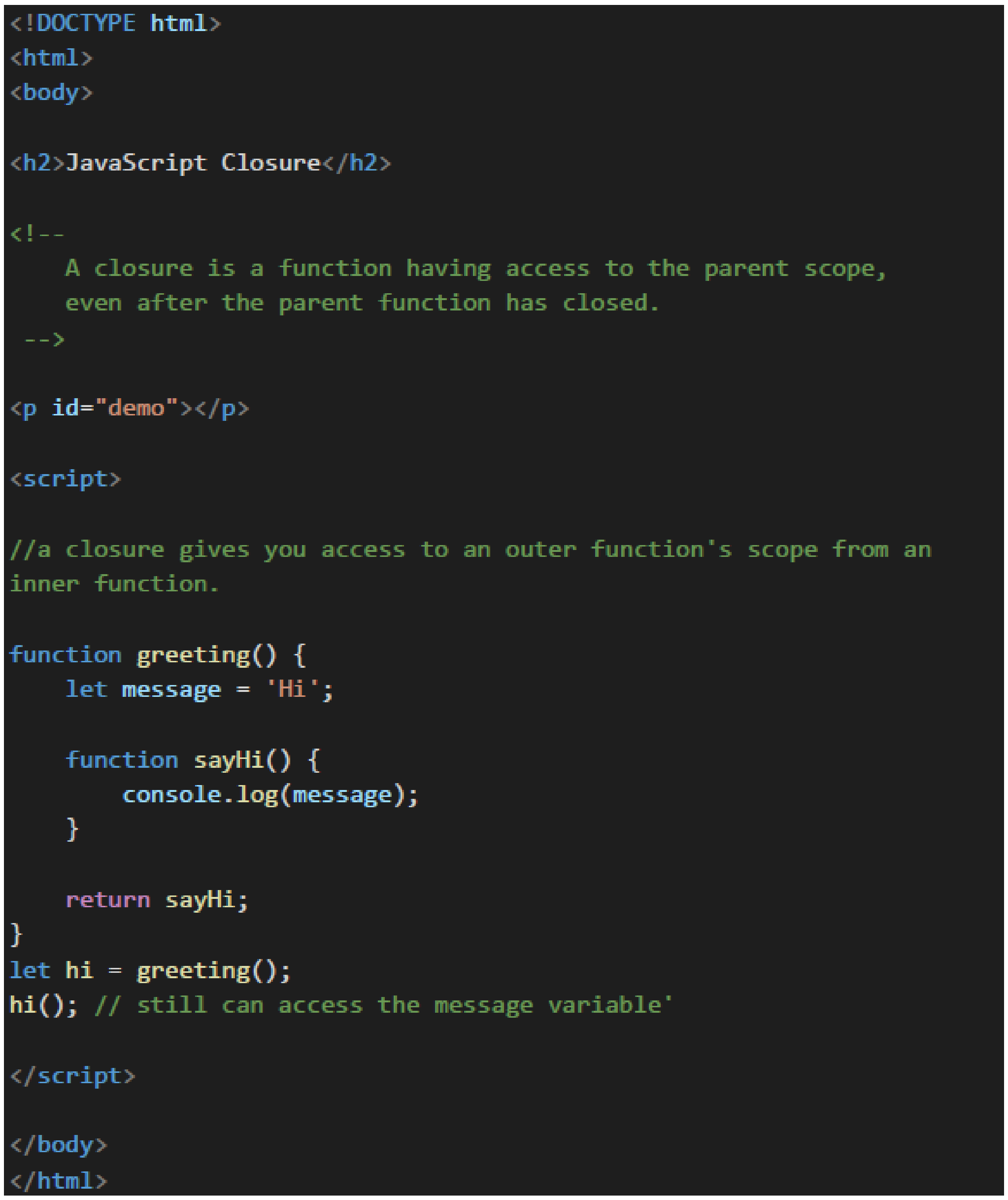
// Create new animal type called animal1
const animal1 = Object.create(Animal);
animal1.displayType(); // Logs: Invertebrates

// Create new animal type called fish
const fish = Object.create(Animal);
fish.type = "Fishes";
fish.displayType(); // Logs: Fishes

</script>

</body>
```

2. JavaScript Closure



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<body>

<h2>JavaScript Closure</h2>

<!--
    A closure is a function having access to the parent scope,
    even after the parent function has closed.
 -->

<p id="demo"></p>

<script>

//a closure gives you access to an outer function's scope from an
inner function.

function greeting() {
    let message = 'Hi';

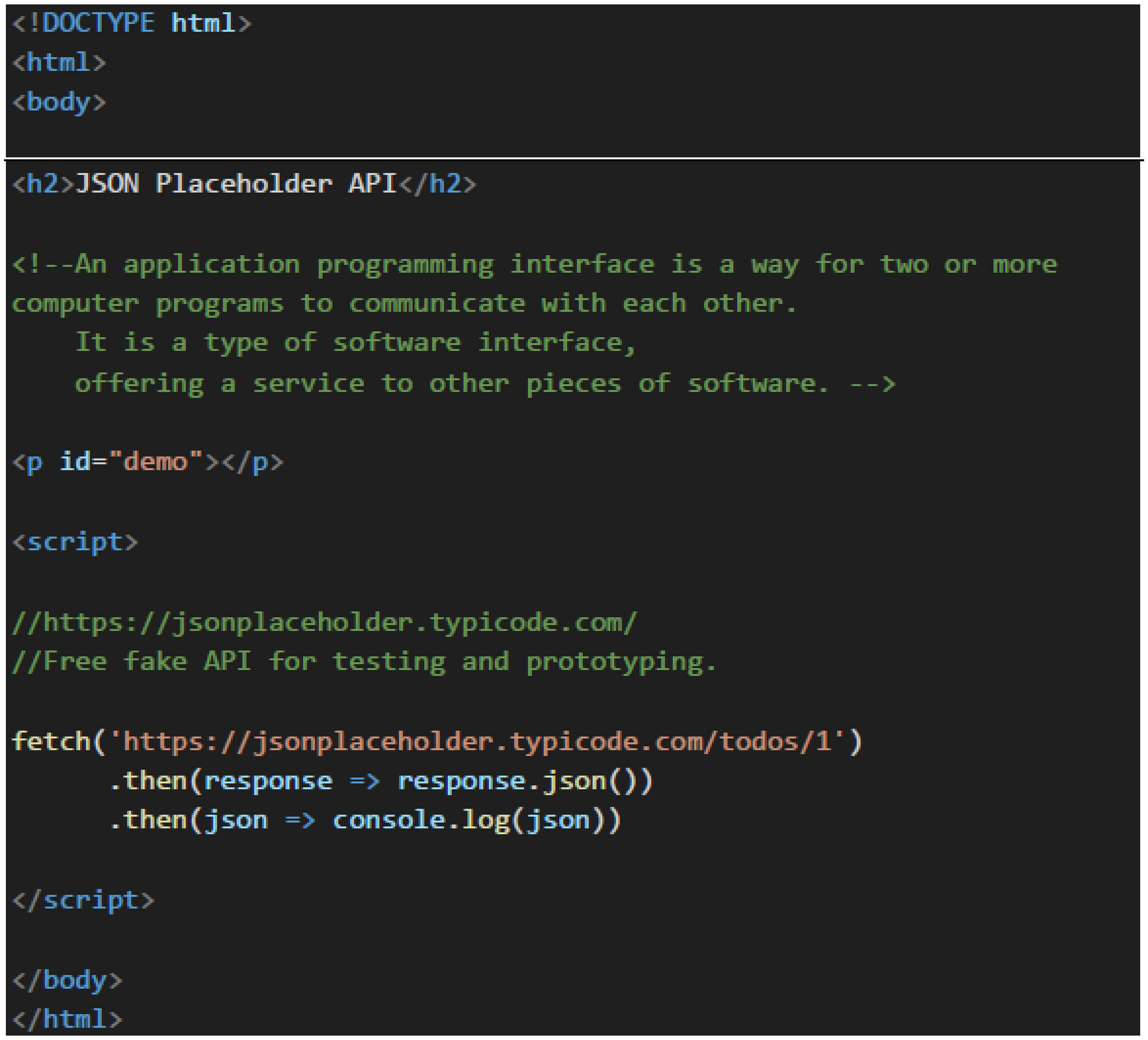
    function sayHi() {
        console.log(message);
    }

    return sayHi;
}
let hi = greeting();
hi(); // still can access the message variable'

</script>

</body>
</html>
```

3. JSON Placeholder API



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<body>

<h2>JSON Placeholder API</h2>

<!--An application programming interface is a way for two or more
computer programs to communicate with each other.
    It is a type of software interface,
    offering a service to other pieces of software. -->

<p id="demo"></p>

<script>

//https://jsonplaceholder.typicode.com/
//Free fake API for testing and prototyping.

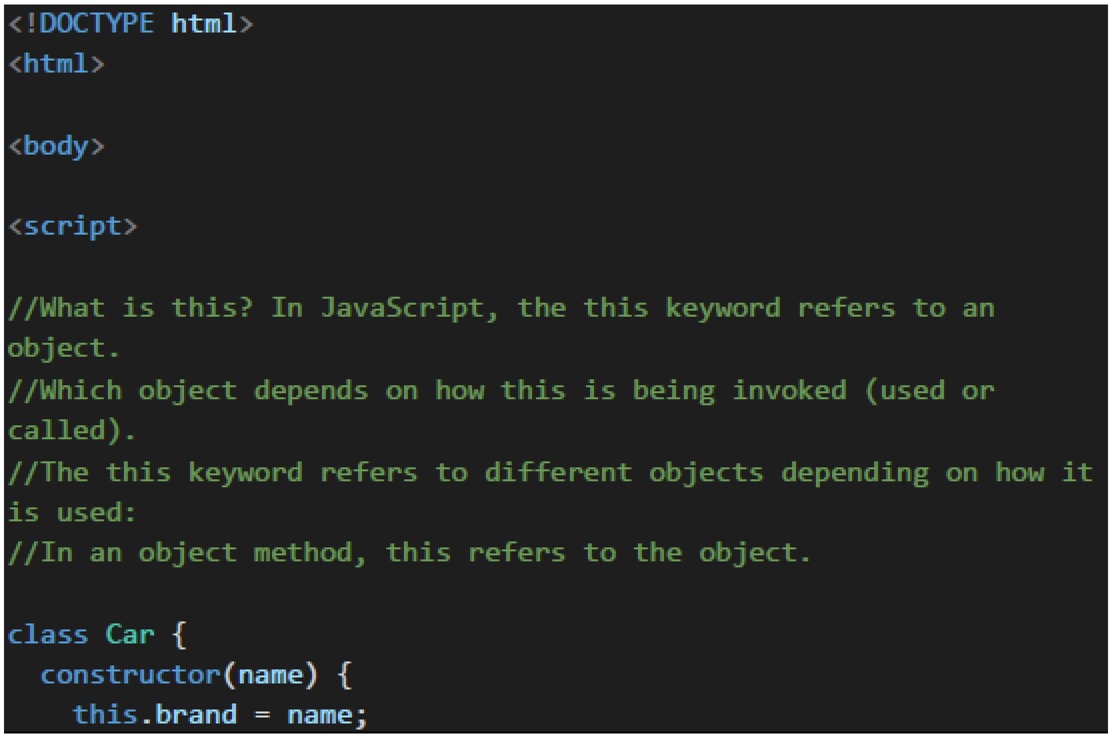
fetch('https://jsonplaceholder.typicode.com/todos/1')
      .then(response => response.json())
      .then(json => console.log(json))

</script>

</body>
</html>
```

ES6 New features

1. Classes
   a. Create a simple class constructor.



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<!DOCTYPE html>
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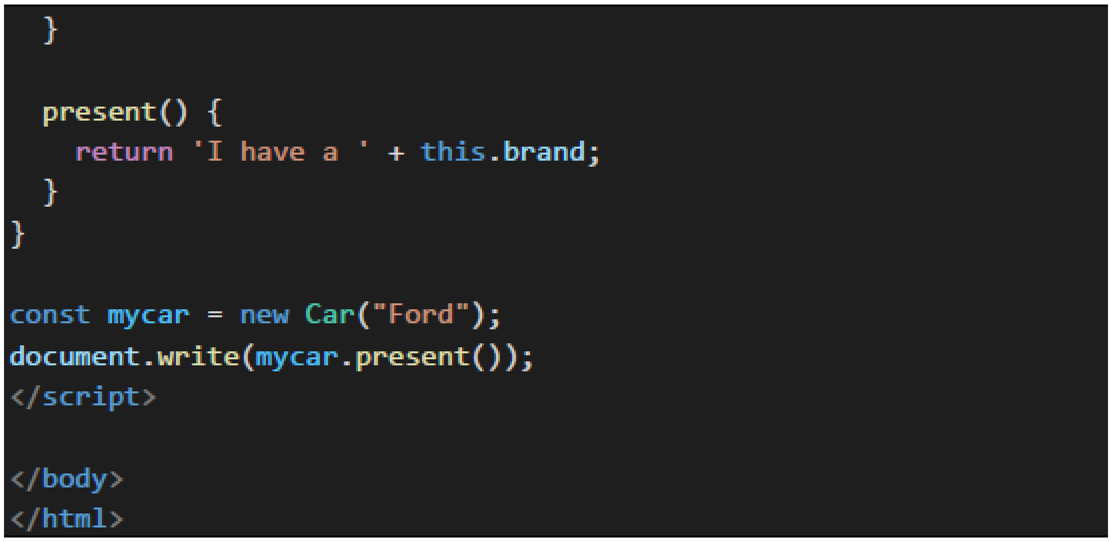
<body>

<script>

//What is this? In JavaScript, the this keyword refers to an
object.
//Which object depends on how this is being invoked (used or
called).
//The this keyword refers to different objects depending on how it
is used:
//In an object method, this refers to the object.

class Car {
  constructor(name) {
    this.brand = name;
```



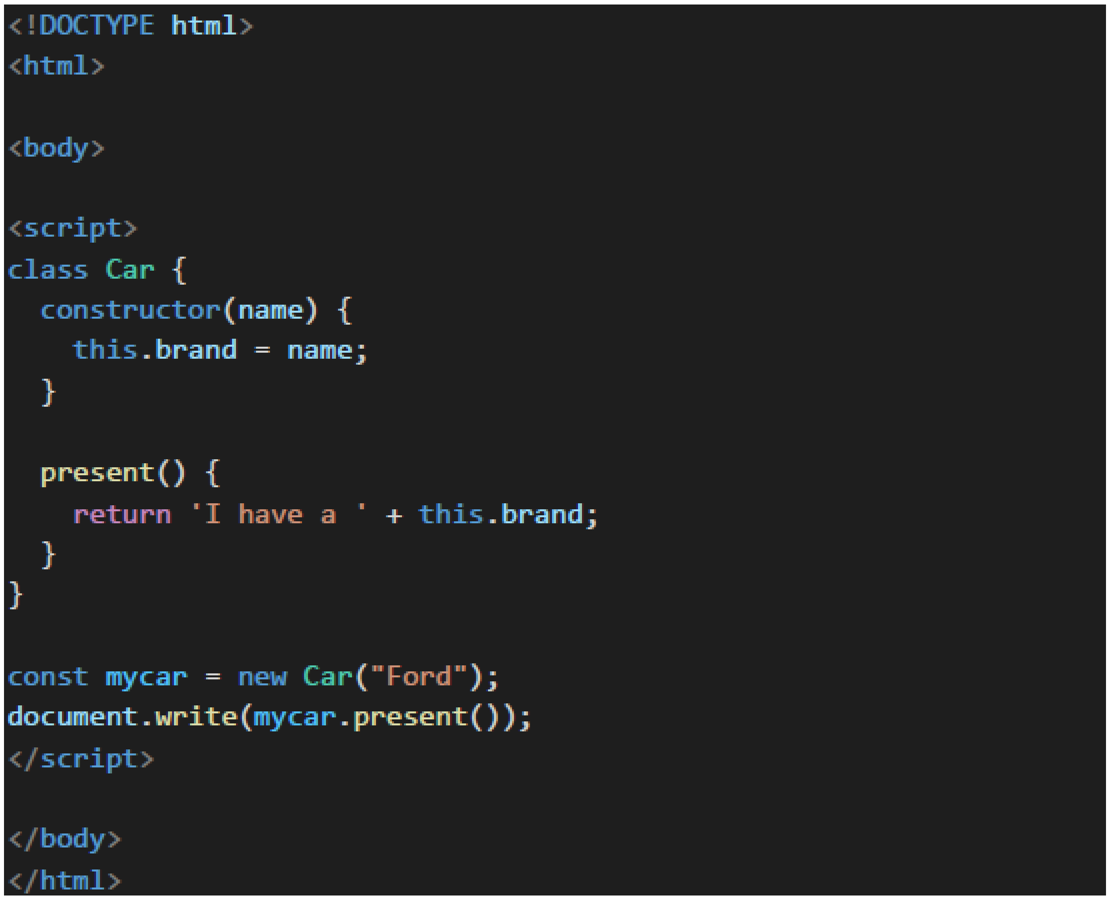
```
  }

  present() {
    return 'I have a ' + this.brand;
  }
}

const mycar = new Car("Ford");
document.write(mycar.present());
</script>

</body>
</html>
```

b. Create a class and define a method inside the class, after that, create an object from the class and execute the methods.



```
<!DOCTYPE html>
<html>

<body>

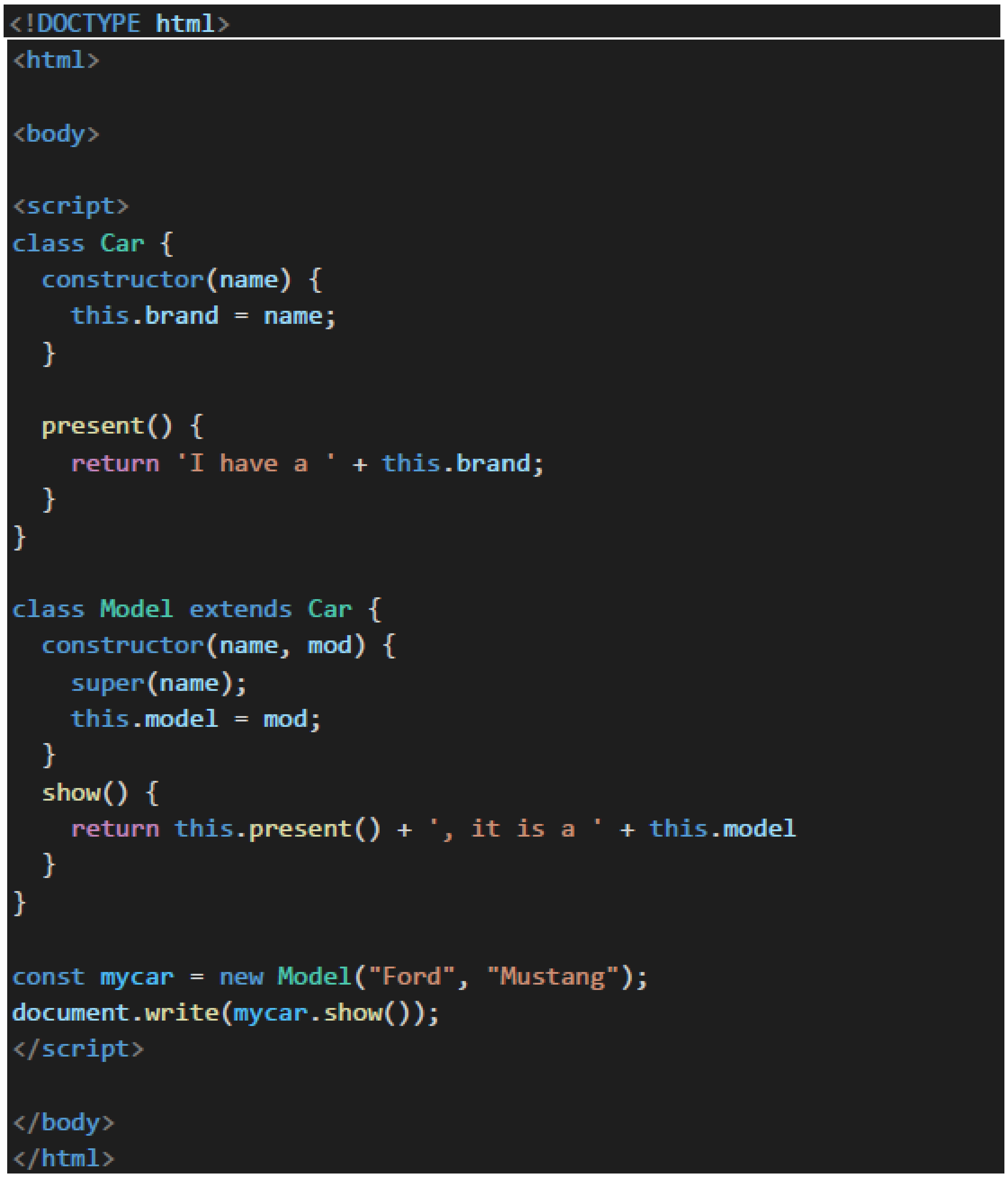
<script>
class Car {
  constructor(name) {
    this.brand = name;
  }

  present() {
    return 'I have a ' + this.brand;
  }
}

const mycar = new Car("Ford");
document.write(mycar.present());
</script>

</body>
</html>
```

c. Class inheritance – create a class (base class) and create another class, derived from base class that you crated and make a method within each class and, execute method within derived class by creating an object of derived class and then, execute the base class's method via that object.



```
<!DOCTYPE html>
<html>

<body>

<script>
class Car {
  constructor(name) {
    this.brand = name;
  }

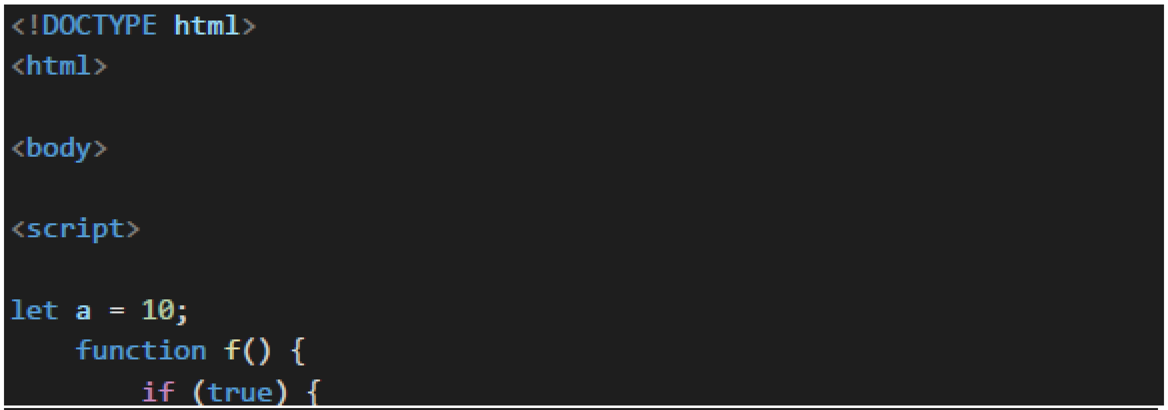
  present() {
    return 'I have a ' + this.brand;
  }
}

class Model extends Car {
  constructor(name, mod) {
    super(name);
    this.model = mod;
  }
  show() {
    return this.present() + ', it is a ' + this.model
  }
}

const mycar = new Model("Ford", "Mustang");
document.write(mycar.show());
</script>

</body>
</html>
```

2. Variables
    a. “var”, “let” and “const” variables. Try their behaviors.



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<!DOCTYPE html>
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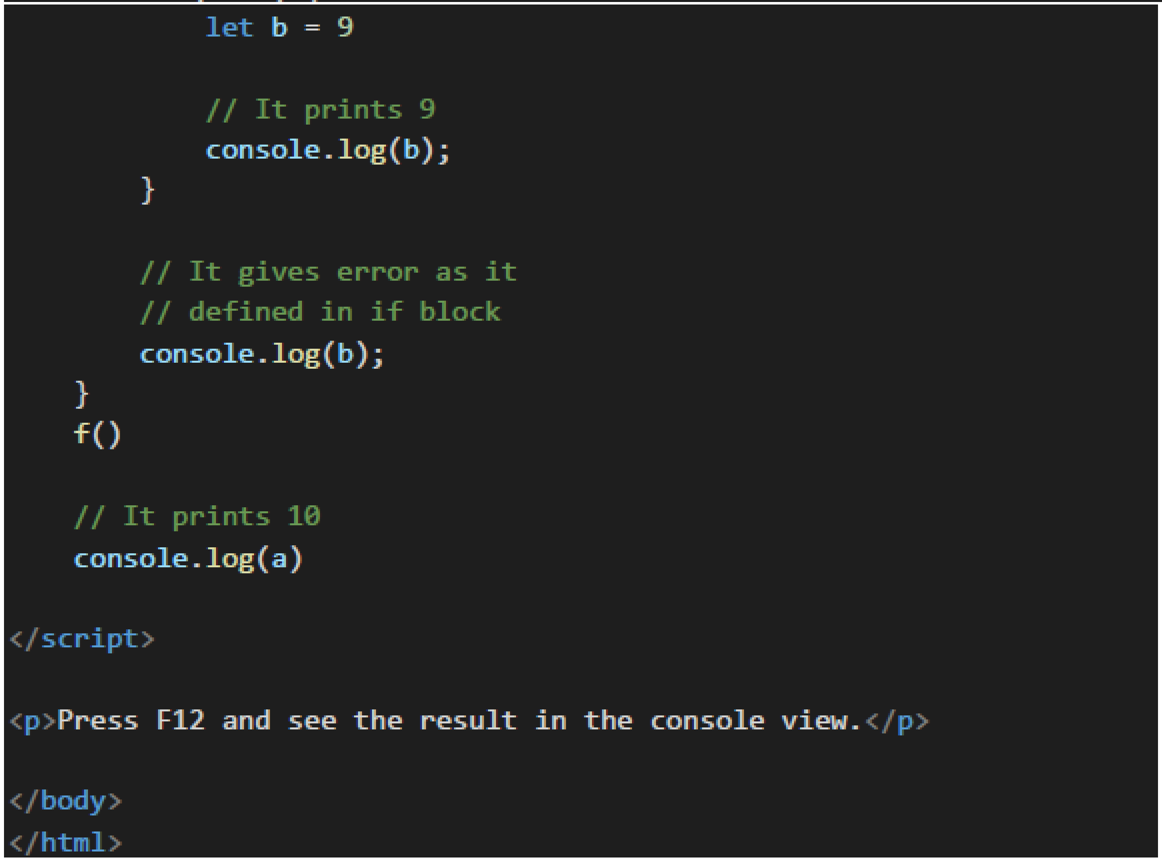
<body>

<script>

let a = 10;
    function f() {
        if (true) {
```



```
            let b = 9

            // It prints 9
            console.log(b);
        }

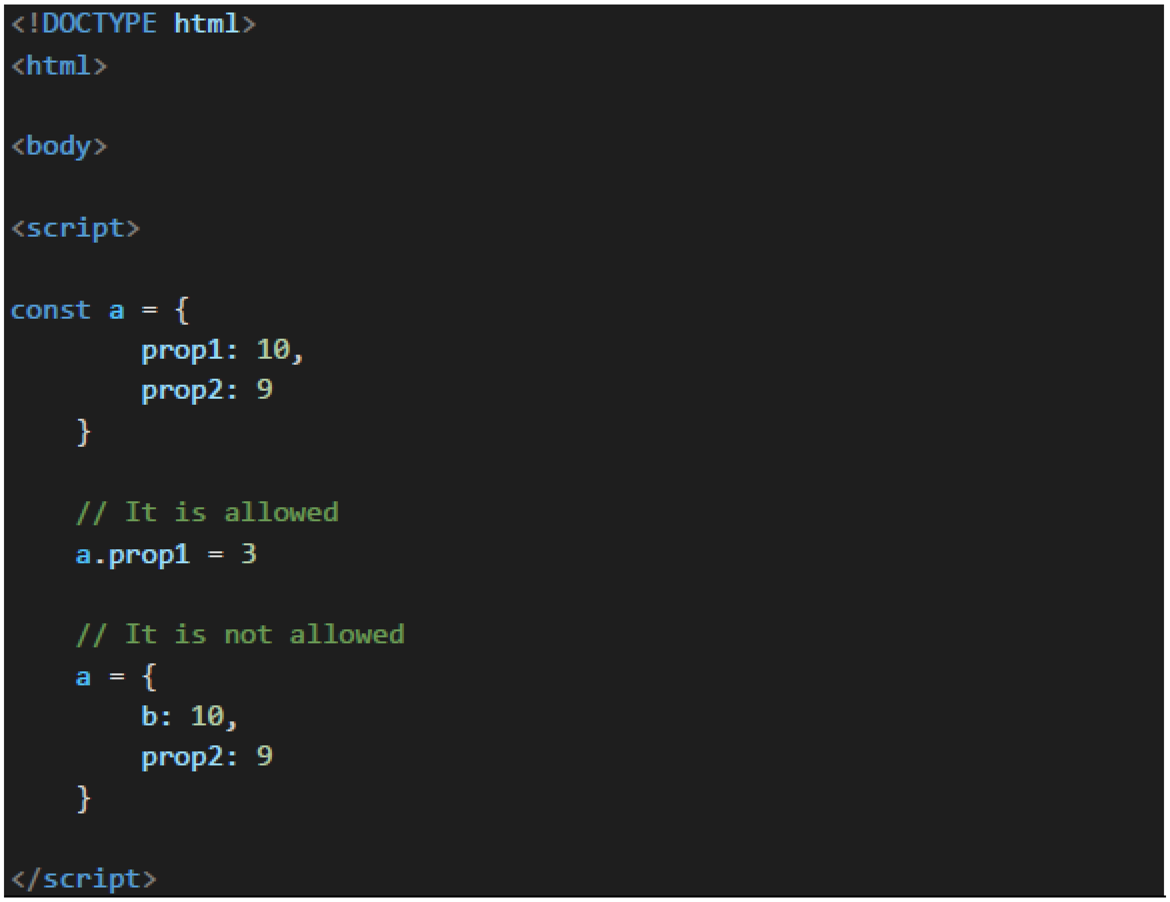
        // It gives error as it
        // defined in if block
        console.log(b);
    }
    f()

    // It prints 10
    console.log(a)

</script>

<p>Press F12 and see the result in the console view.</p>

</body>
</html>
```



```
<!DOCTYPE html>
<html>

<body>

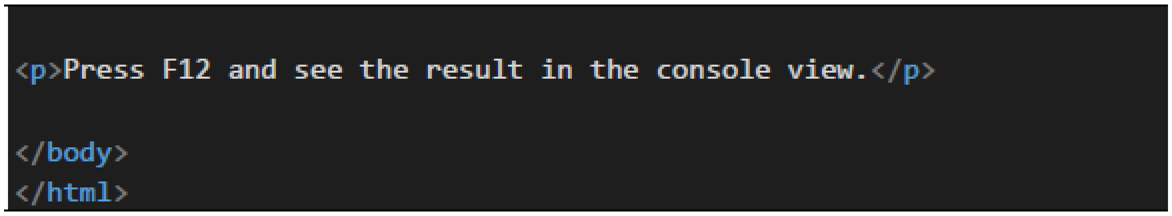
<script>

const a = {
        prop1: 10,
        prop2: 9
    }

    // It is allowed
    a.prop1 = 3

    // It is not allowed
    a = {
        b: 10,
        prop2: 9
    }

</script>
```

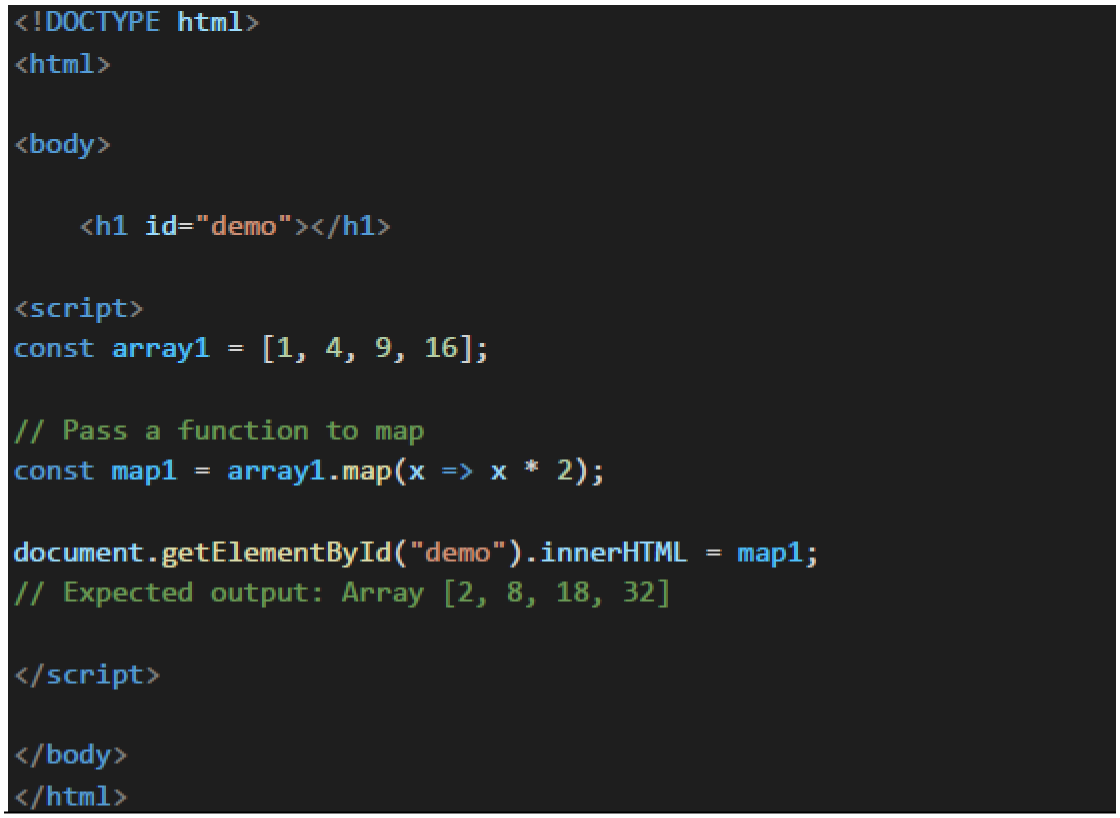


```

<p>Press F12 and see the result in the console view.</p>

</body>
</html>
```

3. Array methods
   a. Map a list of items from an array.



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<!DOCTYPE html>
<html>

<body>

    <h1 id="demo"></h1>

<script>
const array1 = [1, 4, 9, 16];

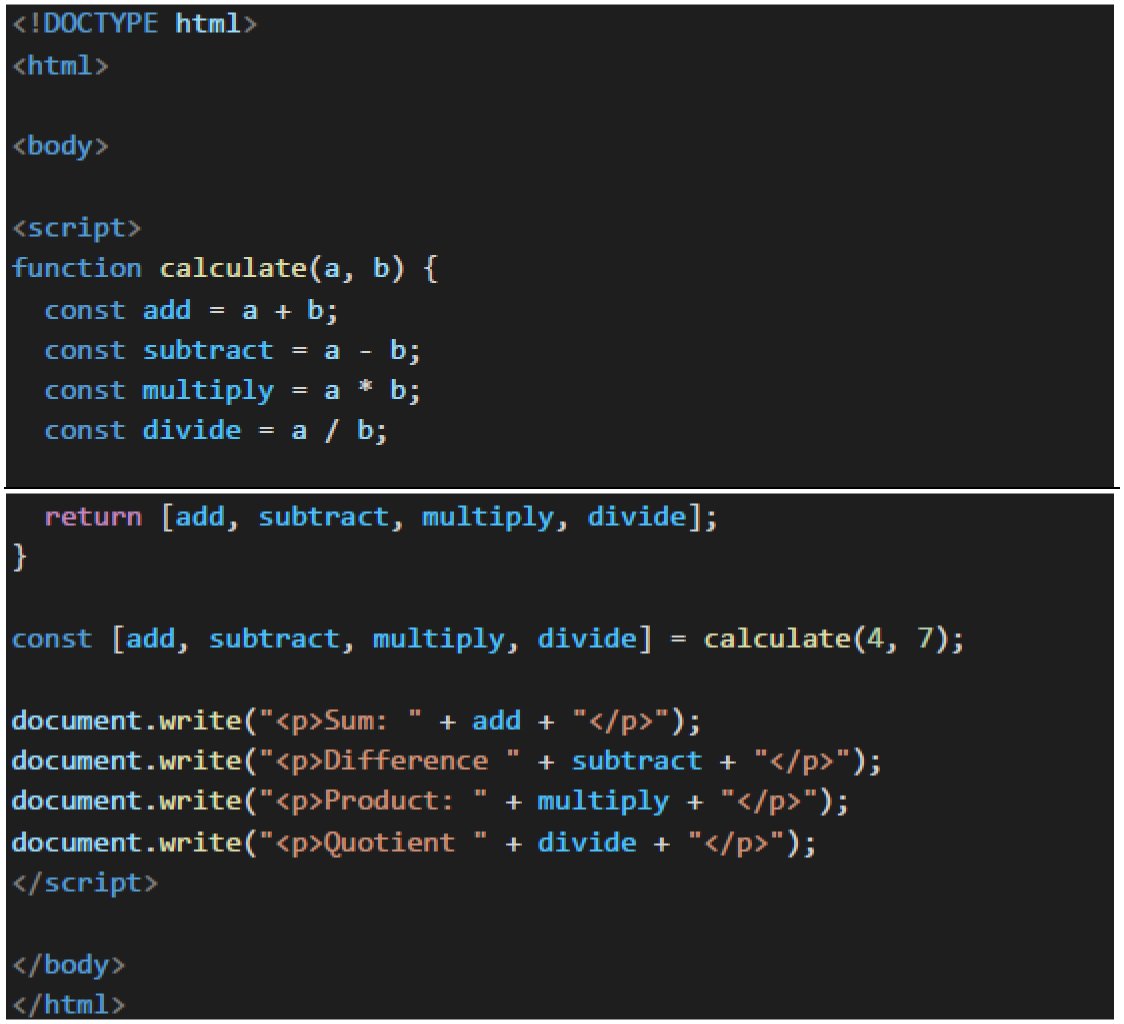
// Pass a function to map
const map1 = array1.map(x => x * 2);

document.getElementById("demo").innerHTML = map1;
// Expected output: Array [2, 8, 18, 32]

</script>

</body>
</html>
```

4. Destructuring
    a. Use destructuring when a function returns an array.



```
<!DOCTYPE html>
<html>

<body>

<script>
function calculate(a, b) {
  const add = a + b;
  const subtract = a - b;
  const multiply = a * b;
  const divide = a / b;

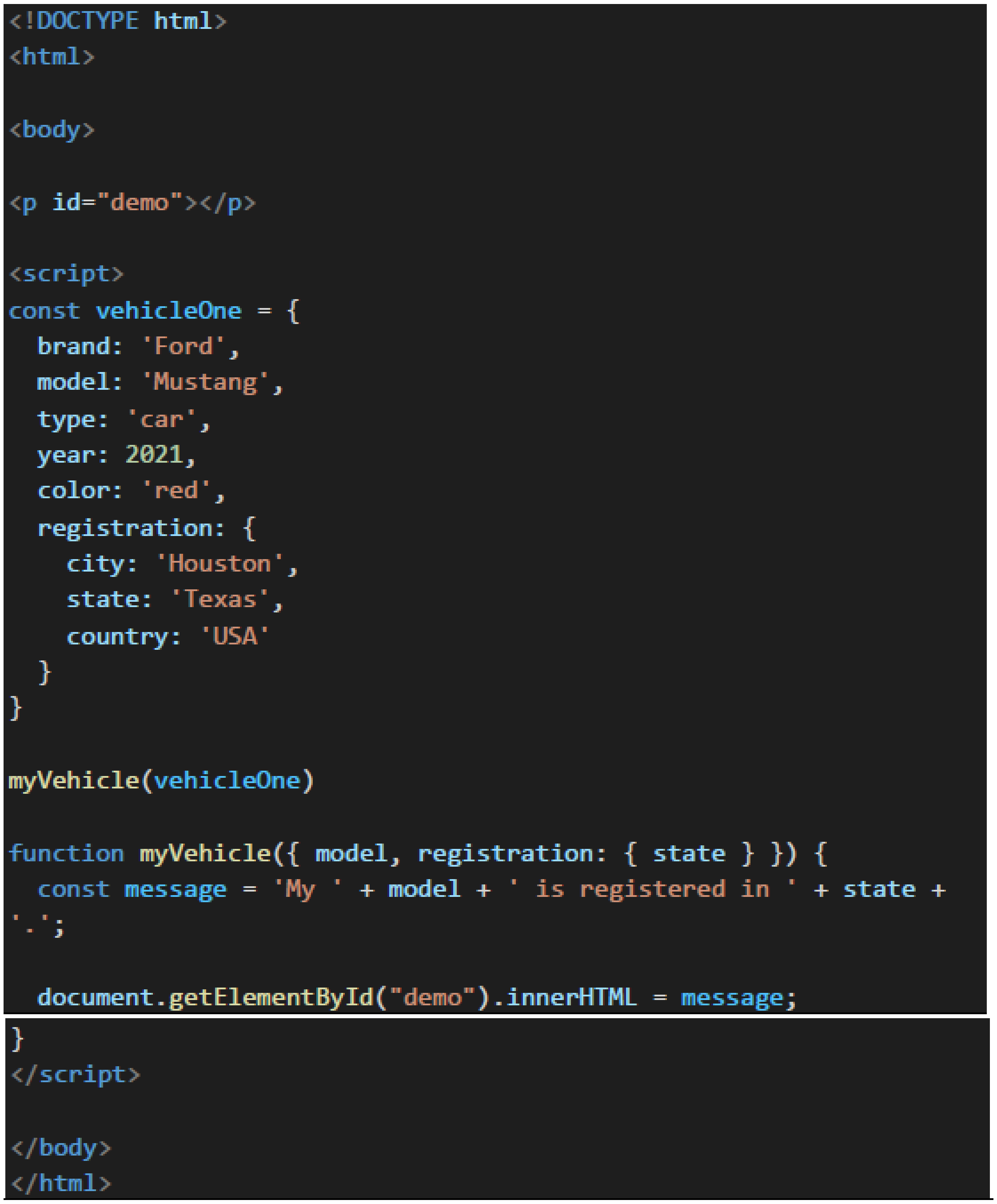
  return [add, subtract, multiply, divide];
}

const [add, subtract, multiply, divide] = calculate(4, 7);

document.write("<p>Sum: " + add + "</p>");
document.write("<p>Difference " + subtract + "</p>");
document.write("<p>Product: " + multiply + "</p>");
document.write("<p>Quotient " + divide + "</p>");
</script>

</body>
</html>
```

b. Destructure deeply nested objects by referencing the nested object then using a colon and curly braces to again destructure the items needed from the nested object.



```
<!DOCTYPE html>
<html>

<body>

<p id="demo"></p>

<script>
const vehicleOne = {
  brand: 'Ford',
  model: 'Mustang',
  type: 'car',
  year: 2021,
  color: 'red',
  registration: {
    city: 'Houston',
    state: 'Texas',
    country: 'USA'
  }
}

myVehicle(vehicleOne)

function myVehicle({ model, registration: { state } }) {
  const message = 'My ' + model + ' is registered in ' + state +
'.';

  document.getElementById("demo").innerHTML = message;
}
</script>

</body>
</html>
```

Self-study activity - Asynchronous JavaScript

Self-study these concepts and attempt the following exercises.

1. JavaScript Callbacks - Write a simple callback function for following scenario

   "The fetchData function takes in a URL and a callback function as parameters. It makes a request to the specified URL using the XMLHttpRequest API, and then calls the callback function with the response data (or an error) when the request is complete. The fetchData function is used with a callback function that logs the response data to the console if there are no errors or logs the error to the console if there is one."

2. JavaScript Promises - Write a simple promise for following scenario

   "The fetchData function returns a Promise object that wraps an XMLHttpRequest. The Promise object is either resolved with the response data or rejected with an error message, depending on the result of the request. The fetchData function is used with a then method that logs the response data to the console if the Promise is resolved, or a catch method that logs the error to the console if the Promise is rejected."

3. JavaScript async & await - Write the code that explains following scenario

   "The fetchDataAsync function is an asynchronous function that uses the await keyword to wait for the Promise returned by fetchData to be resolved or rejected. The try...catch block is used to handle any errors that occur during the execution of the function. The fetchDataAsync function is used to fetch data from a URL and log it to the console if there are no errors, or log the error to the console if there is one."