Lecture 7

JavaScript

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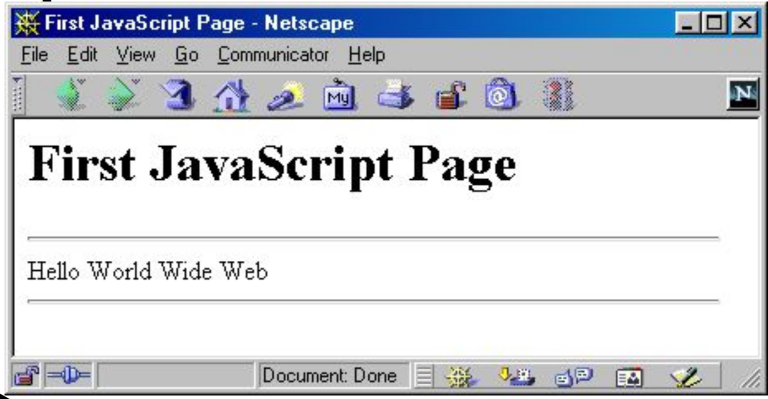
A simple Script

```
<html>
<head><title>First JavaScript
   Page</title></head>
<body>
<h1>First JavaScript Page</h1>
<script type="text/javascript">
  document.write("<hr>");
  document.write("Hello World Wide
  Web");
  document.write("<hr>");
</script>
</body>
</html>
```


First JavaScript Page - Netscape
File Edit View Go Communicator Help
Document: Done

First JavaScript Page

Hello World Wide Web

Embedding JavaScript

```
<html>
<head><title>First JavaScript Program</title></head>
<body>
<script type="text/javascript"
        src="your_source_file.js"></script>
</body>
</html>
```

Inside your_source_file.js

```
document.write("<hr>");
document.write("Hello World Wide Web");
document.write("<hr>");
```

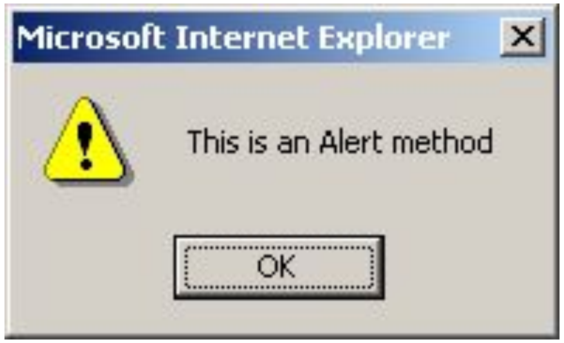
- Use the **`src`** attribute to include JavaScript codes from an external file.
- The included code is inserted in place.

Popup Boxes

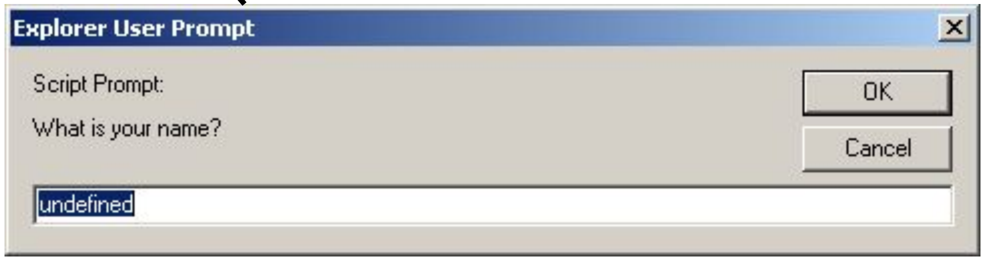
- Alert box
- Confirm box
- Prompts box

alert(), confirm(), and prompt()

```
<script type="text/javascript">
alert("This is an Alert method");
confirm("Are you OK?");
prompt("What is your name?");
prompt("How old are you?","20");
</script>
```

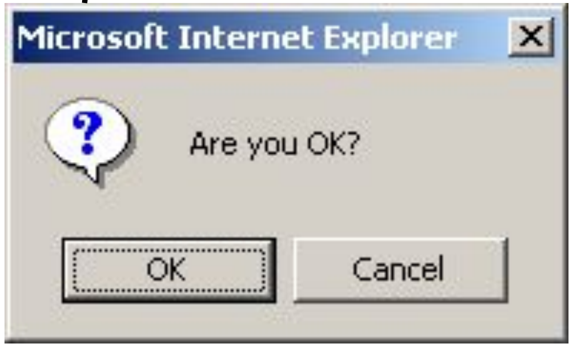

Microsoft Internet Explorer

This is an Alert method

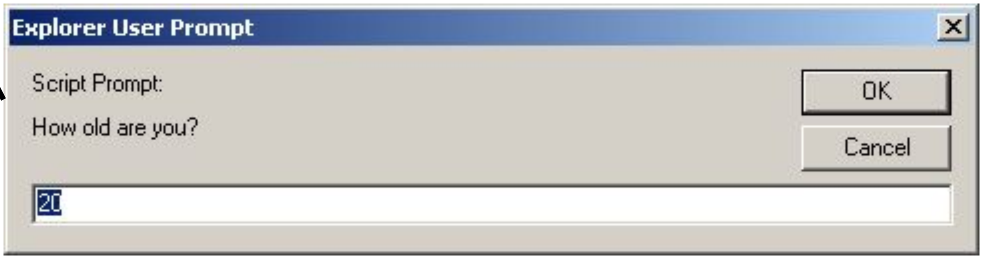

Explorer User Prompt

Script Prompt:
What is your name?

undefined


Microsoft Internet Explorer

Are you OK?

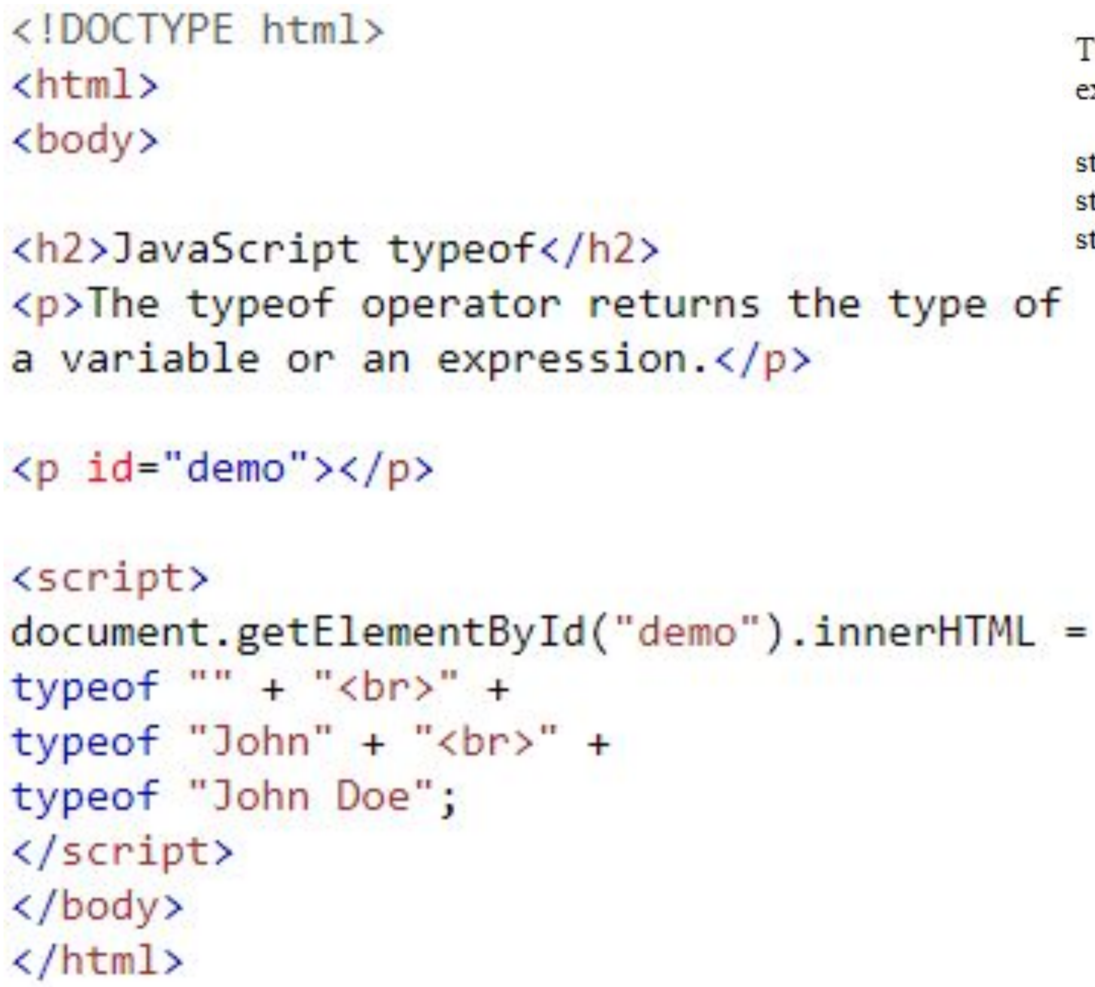

Explorer User Prompt

Script Prompt:
How old are you?

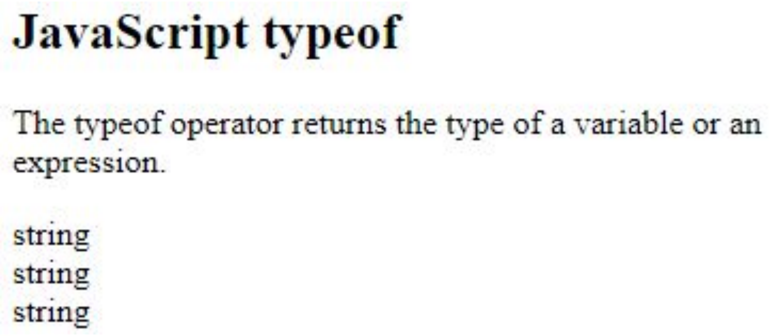
20

The typeof operator

- **typeof** operator used to find the type of a JavaScript variable.



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

<h2>JavaScript typeof</h2>
<p>The typeof operator returns the type of
a variable or an expression.</p>

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

<script>
document.getElementById("demo").innerHTML =
typeof "" + "<br>" +
typeof "John" + "<br>" +
typeof "John Doe";
</script>
</body>
</html>
```

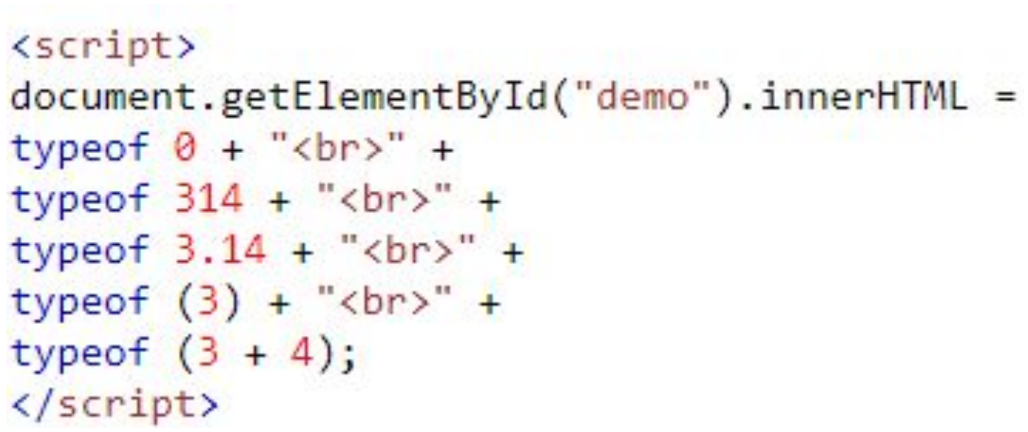


JavaScript typeof

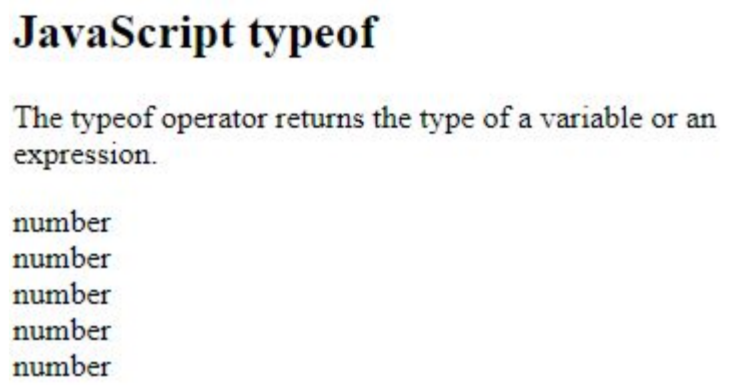
The typeof operator returns the type of a variable or an expression.

```
string
string
string
```

Example



```
<script>
document.getElementById("demo").innerHTML =
typeof 0 + "<br>" +
typeof 314 + "<br>" +
typeof 3.14 + "<br>" +
typeof (3) + "<br>" +
typeof (3 + 4);
</script>
```



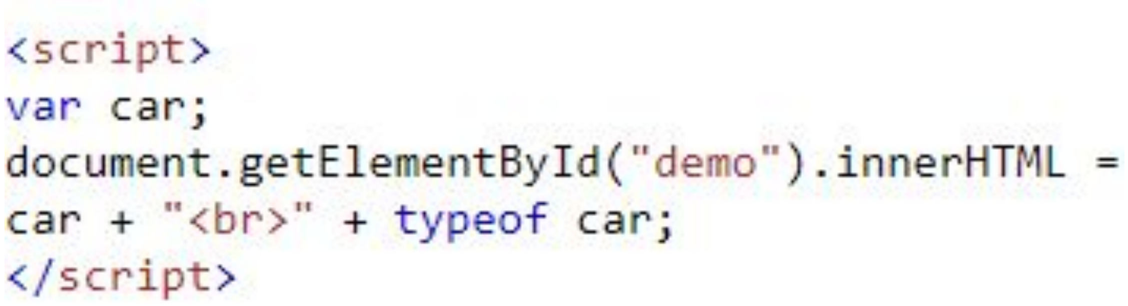
JavaScript typeof

The typeof operator returns the type of a variable or an expression.

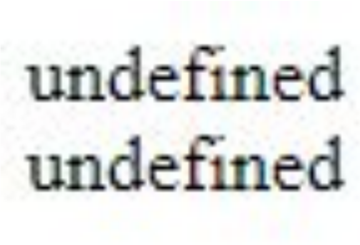
```
number
number
number
number
number
```

Undefined data type

- In JavaScript, a variable without a value, has the value **undefined**. The typeof is also **undefined**.



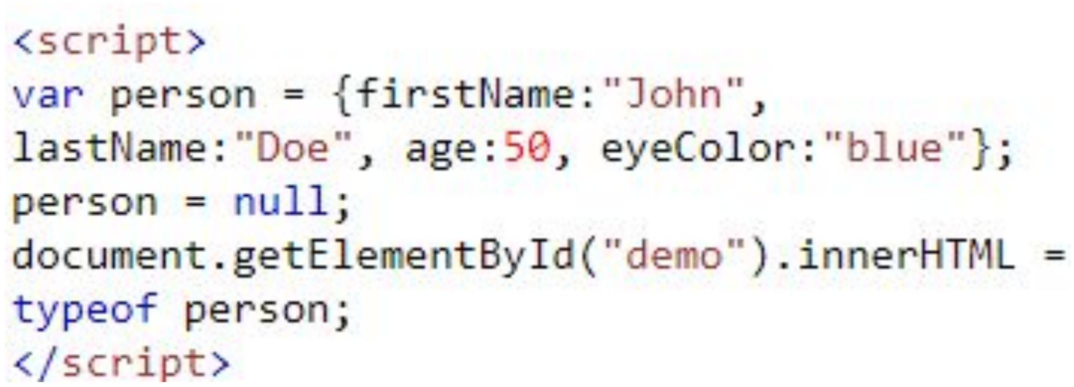
```
<script>
var car;
document.getElementById("demo").innerHTML =
car + "<br>" + typeof car;
</script>
```



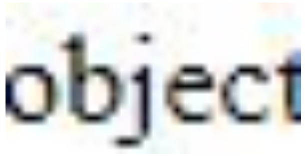
```
undefined
undefined
```

Null

- In JavaScript null is "nothing". It is supposed to be something that doesn't exist.
- Unfortunately, in JavaScript, the data type of null is an object.

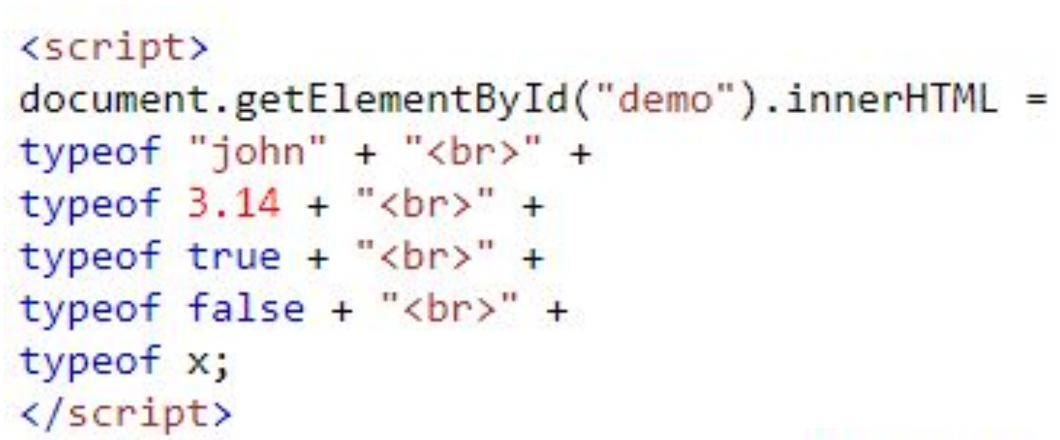


```
<script>
var person = {firstName:"John",
lastName:"Doe", age:50, eyeColor:"blue"};
person = null;
document.getElementById("demo").innerHTML =
typeof person;
</script>
```

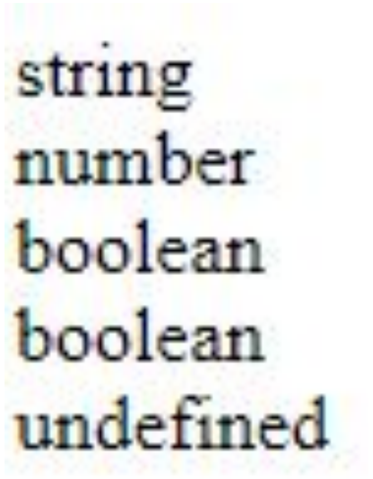


```
object
```

Primitive Data

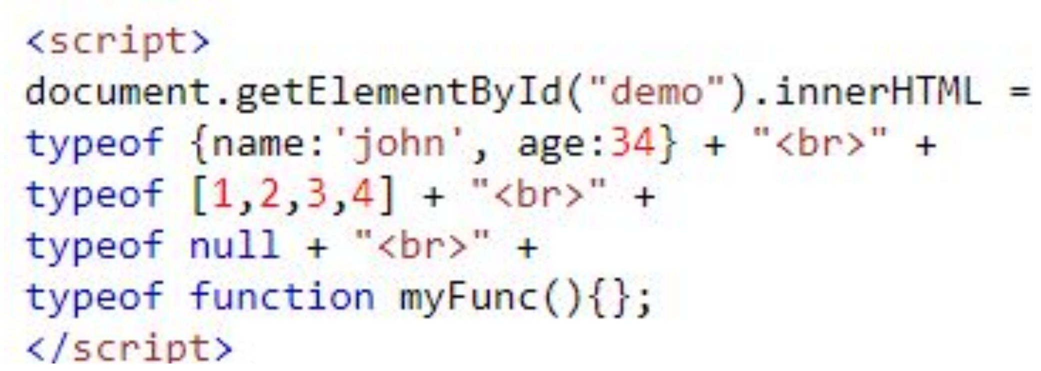


```
<script>
document.getElementById("demo").innerHTML =
typeof "john" + "<br>" +
typeof 3.14 + "<br>" +
typeof true + "<br>" +
typeof false + "<br>" +
typeof x;
</script>
```

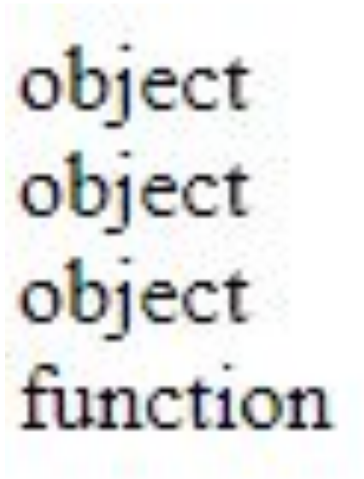


```
string
number
boolean
boolean
undefined
```

Complex Data



```
<script>
document.getElementById("demo").innerHTML =
typeof {name:'john', age:34} + "<br>" +
typeof [1,2,3,4] + "<br>" +
typeof null + "<br>" +
typeof function myFunc(){};
</script>
```



```
object
object
object
function
```

Line Breaks

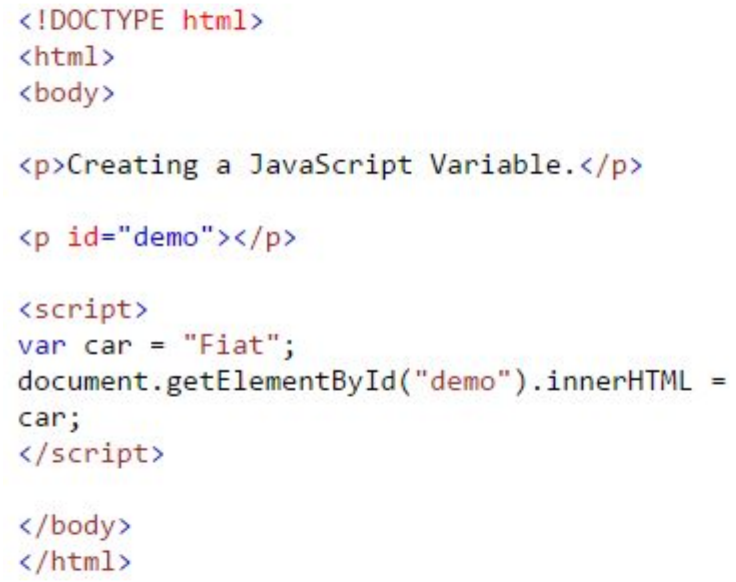
- To display line breaks inside a popup box, use a back –slash followed by the character n.
- Example: alert(“Hello\n How are you?”);

JavaScript Objects

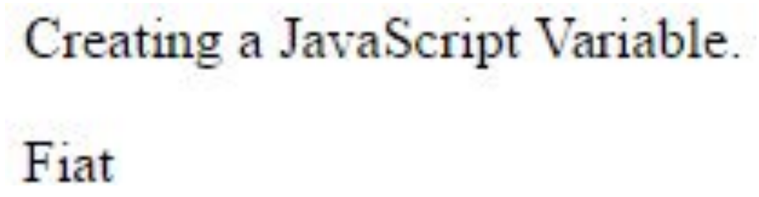
- Objects in real life is for instance Students
- Properties: name, ID, weigh, height etc.
- Methods: eat, speak, walk, read, do something and etc.

JavaScript Objects

- You have already learned that JavaScript variables are containers for data values.



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

<p>Creating a JavaScript Variable.</p>

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

<script>
var car = "Fiat";
document.getElementById("demo").innerHTML =
car;
</script>

</body>
</html>
```

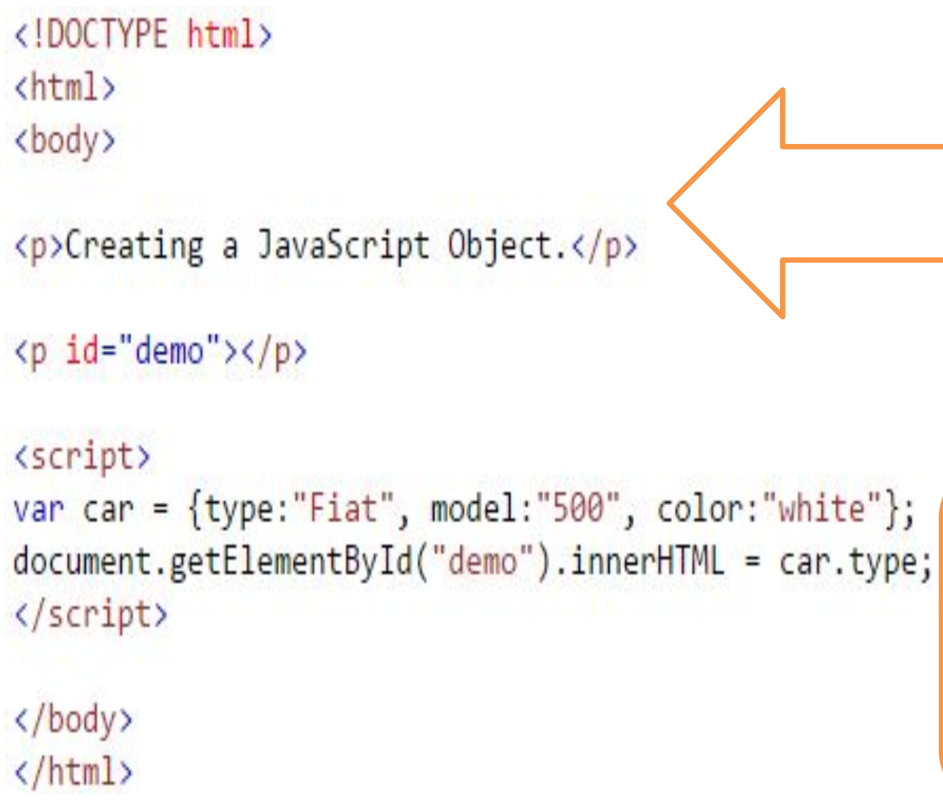


```
Creating a JavaScript Variable.

Fiat
```

Objects

- Objects are variables too.
- Objects can contain many values

Example



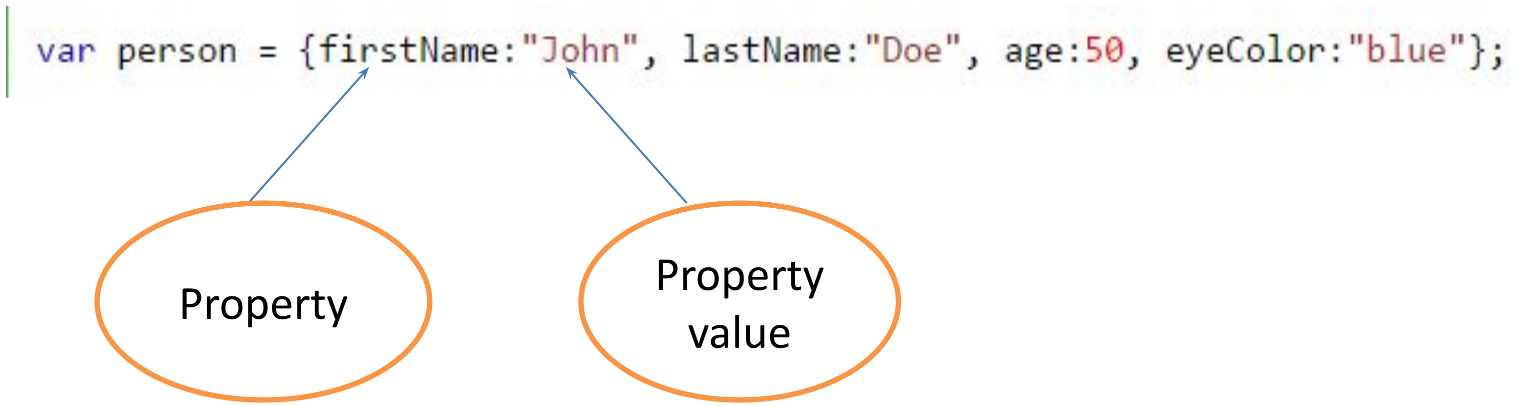
```
<!DOCTYPE html>
<html>
<body>

<p>Creating a JavaScript Object.</p>

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

<script>
var car = {type:"Fiat", model:"500", color:"white"};
document.getElementById("demo").innerHTML = car.type;
</script>

</body>
</html>
```

This code assigns **many values** (Fiat, 500, white) to a variable named **car**

The values are written as **name: value** pairs (name and value separated by a colon)

Object Properties

- The name: values pairs are called properties.

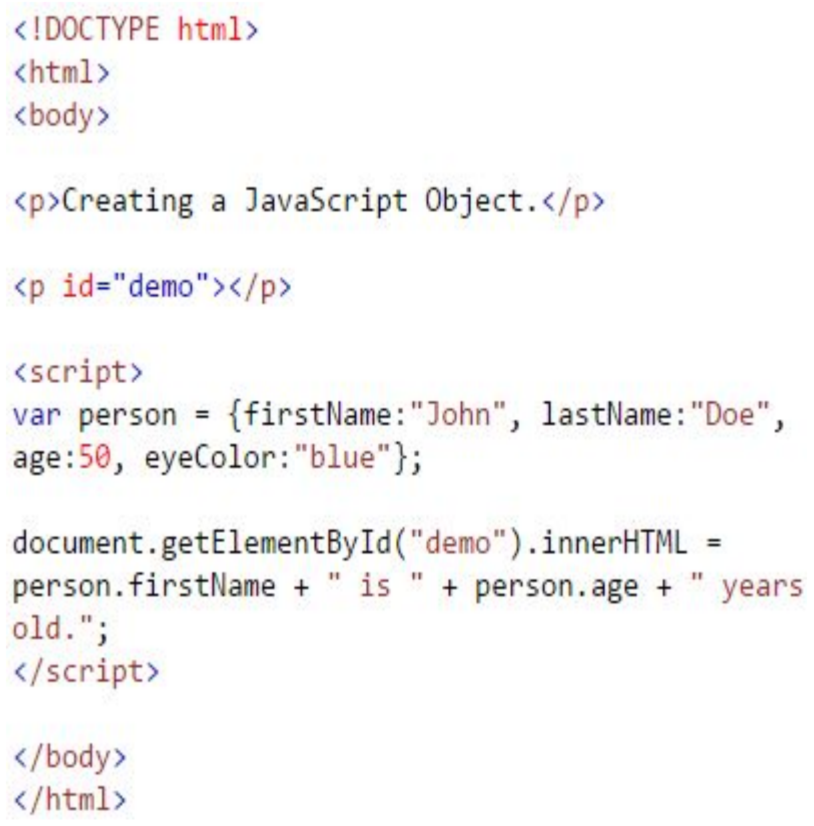


```
var person = {firstName:"John", lastName:"Doe", age:50, eyeColor:"blue"};
```

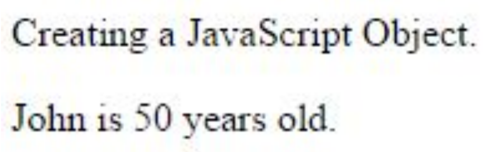
Object Methods

- Methods are actions that can be performed on objects.
- Methods are stored in properties as function definitions

Example



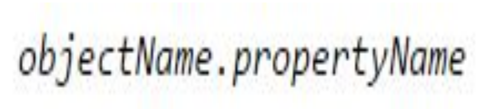
```
<!DOCTYPE html>
<html>
<body>

<p>Creating a JavaScript Object.</p>

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

<script>
var person = {firstName:"John", lastName:"Doe",
age:50, eyeColor:"blue"};

document.getElementById("demo").innerHTML =
person.firstName + " is " + person.age + " years
old.";
</script>

</body>
</html>
```



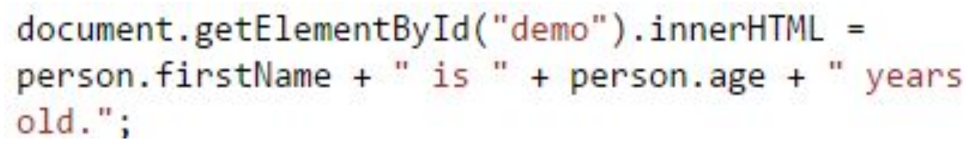
```
Creating a JavaScript Object.

John is 50 years old.
```

Accessing Object Properties

- 2 ways

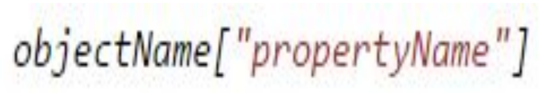


```
objectName.propertyName
```

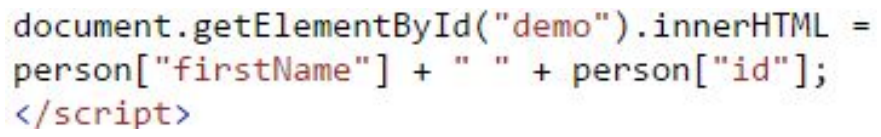


```
document.getElementById("demo").innerHTML =
person.firstName + " is " + person.age + " years
old.";
```

Or



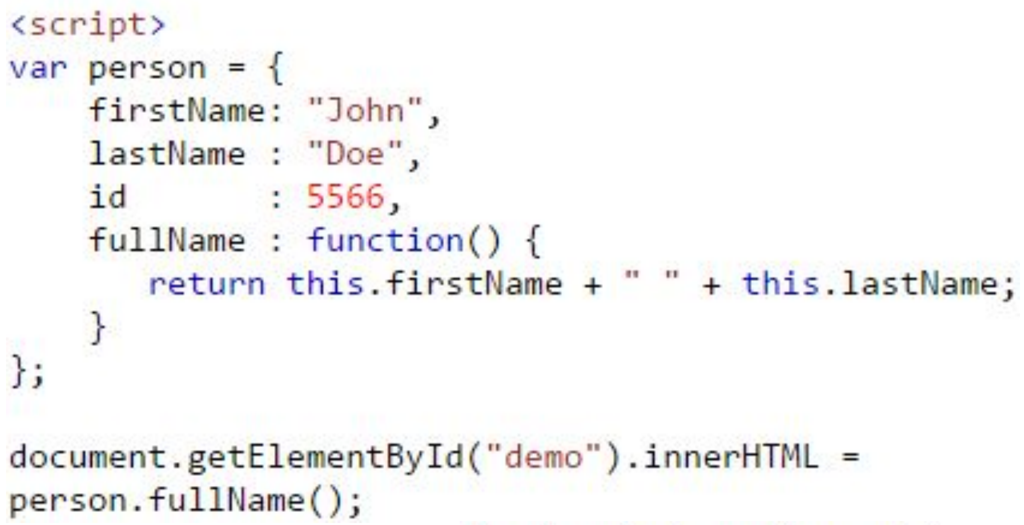
```
objectName["propertyName"]
```



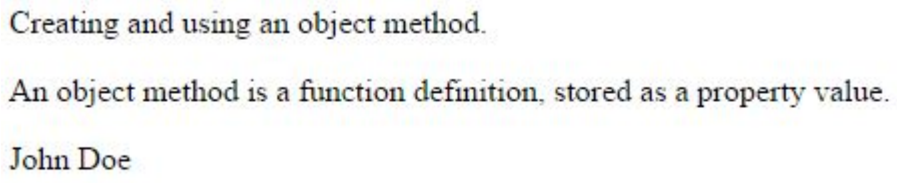
```
document.getElementById("demo").innerHTML =
person["firstName"] + " " + person["id"];
</script>
```

Accessing Object methods

- ObjectName.methodName()



```
<script>
var person = {
    firstName: "John",
    lastName : "Doe",
    id       : 5566,
    fullName : function() {
       return this.firstName + " " + this.lastName;
    }
};

document.getElementById("demo").innerHTML =
person.fullName();
```

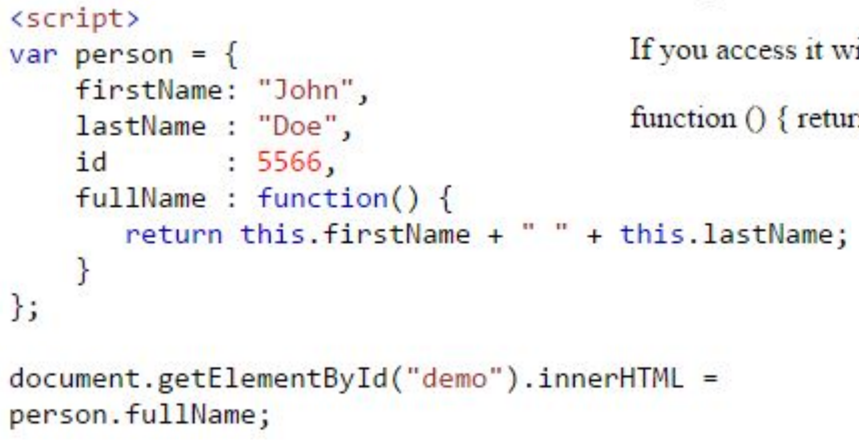


Creating and using an object method.

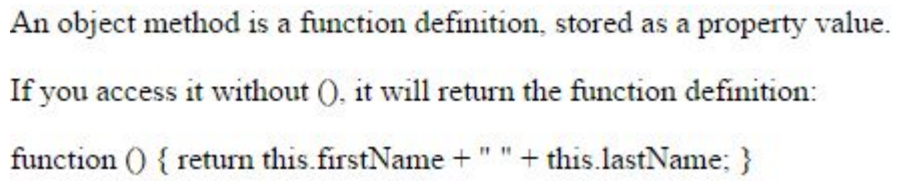
An object method is a function definition, stored as a property value.

John Doe

Example



```
<script>
var person = {
    firstName: "John",
    lastName : "Doe",
    id       : 5566,
    fullName : function() {
       return this.firstName + " " + this.lastName;
    }
};

document.getElementById("demo").innerHTML =
person.fullName;
```



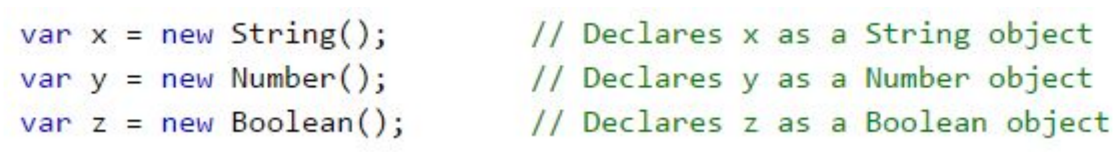
An object method is a function definition, stored as a property value.

If you access it without (), it will return the function definition:

function () { return this.firstName + " " + this.lastName; }

Do Not Declare Strings, Numbers, and Booleans as Objects!

- When a JavaScript variable is declared with the keyword "new", the variable is created as an object:



```
var x = new String();        // Declares x as a String object
var y = new Number();        // Declares y as a Number object
var z = new Boolean();       // Declares z as a Boolean object
```

Conditional Statements

- Very often when you write code, you want to perform different actions for different decisions. You can use conditional statements in your code to do this.

Types of conditional statements

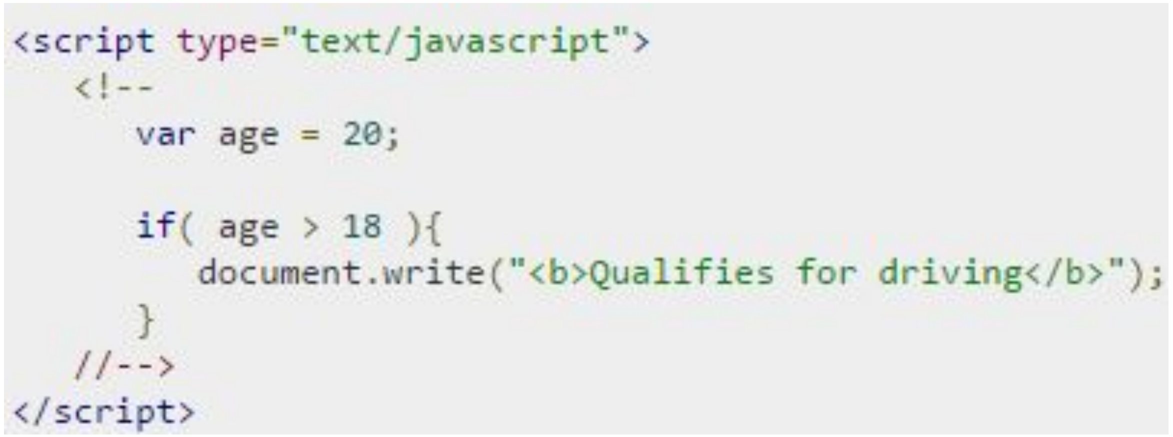
- **if statement** - use this statement if you want to execute some code only if a specified condition is true
- **if...else statement** - use this statement if you want to execute some code if the condition is true and another code if the condition is false
- **if...else if....else statement** - use this statement if you want to select one of many blocks of code to be executed
- **switch statement** - use this statement if you want to select one of many blocks of code to be executed

If statement Syntax and example

- If (expression) {

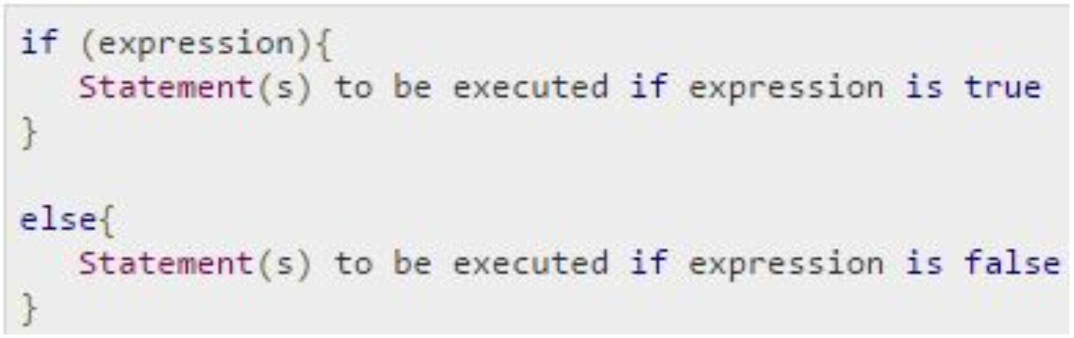
Statements to be executed if expression is true

}

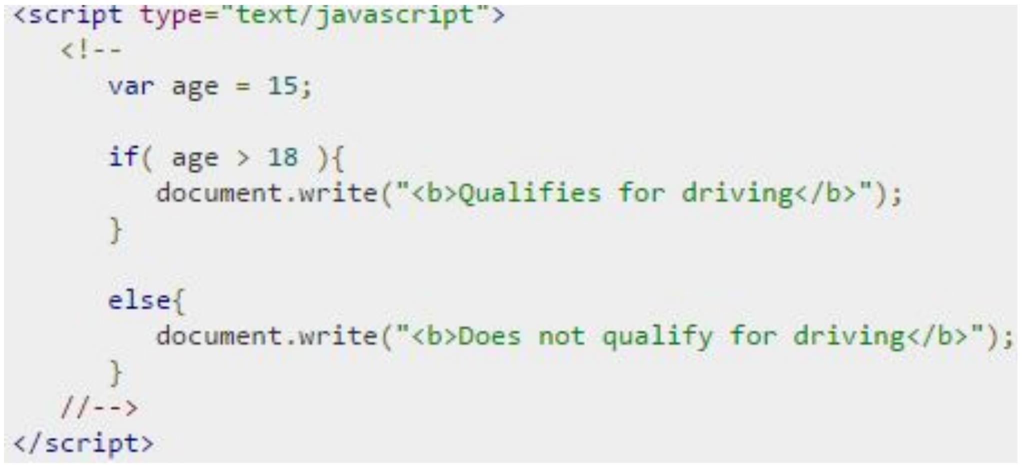


```
<script type="text/javascript">
   <!--
      var age = 20;

      if( age > 18 ){
         document.write("<b>Qualifies for driving</b>");
      }
   //-->
</script>
```

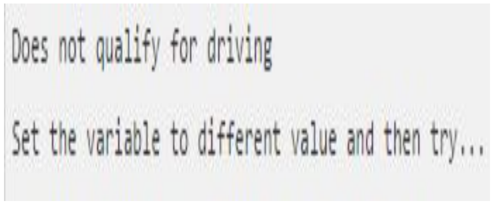
If .. Else statement



```
if (expression){
   Statement(s) to be executed if expression is true
}

else{
   Statement(s) to be executed if expression is false
}
```

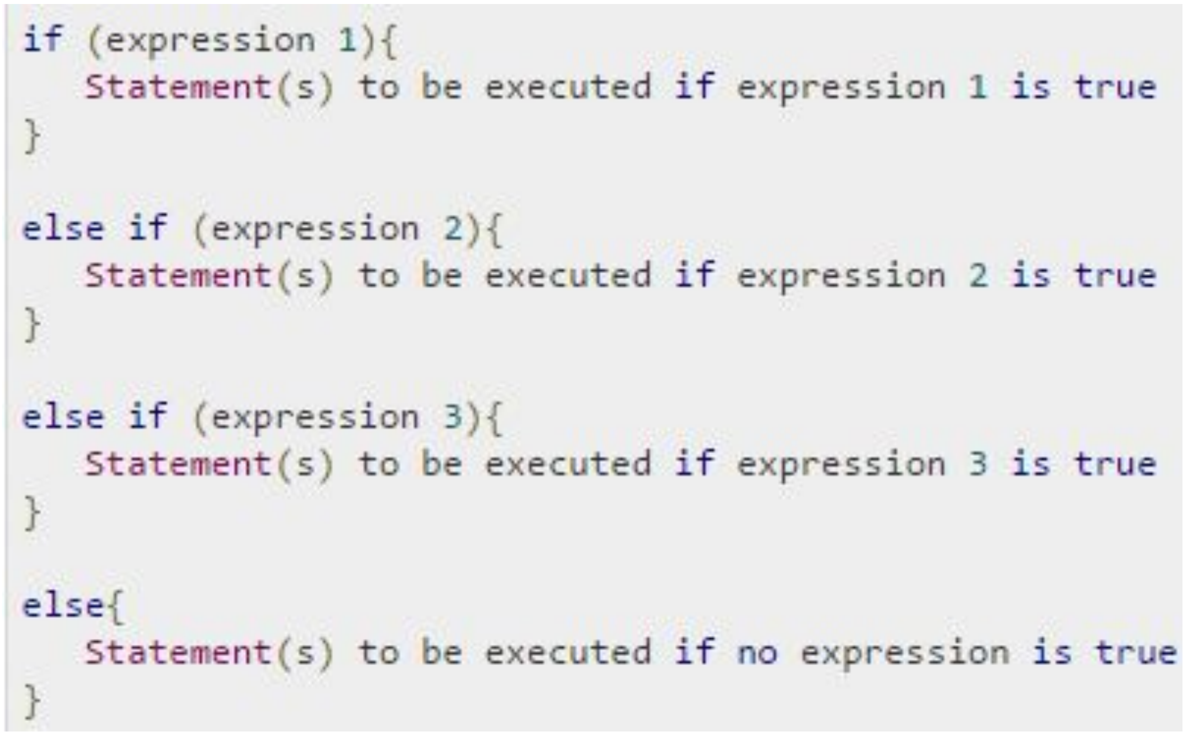


```
<script type="text/javascript">
   <!--
      var age = 15;

      if( age > 18 ){
         document.write("<b>Qualifies for driving</b>");
      }

      else{
         document.write("<b>Does not qualify for driving</b>");
      }
   //-->
</script>
```



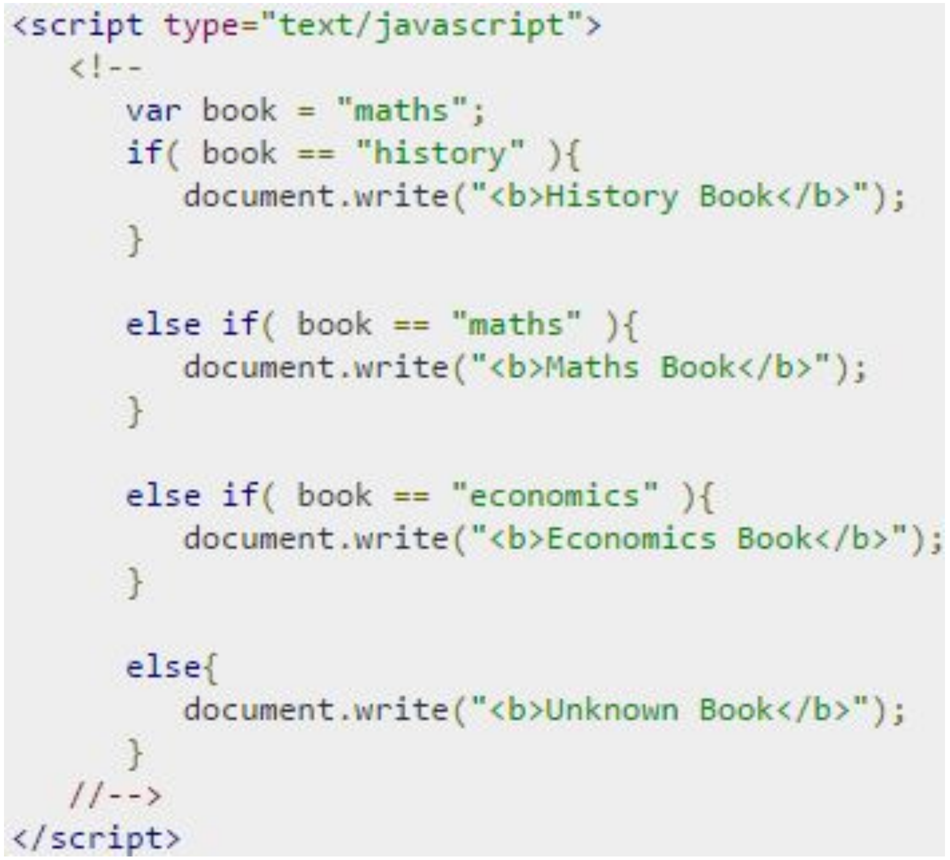
```
Does not qualify for driving

Set the variable to different value and then try...
```

If…else if… statement syntax

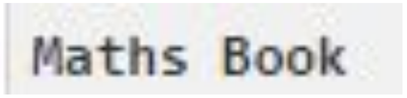


```
if (expression 1){
   Statement(s) to be executed if expression 1 is true
}

else if (expression 2){
   Statement(s) to be executed if expression 2 is true
}

else if (expression 3){
   Statement(s) to be executed if expression 3 is true
}

else{
   Statement(s) to be executed if no expression is true
}
```

If…else if… statement example



```
<script type="text/javascript">
   <!--
      var book = "maths";
      if( book == "history" ){
         document.write("<b>History Book</b>");
      }

      else if( book == "maths" ){
         document.write("<b>Maths Book</b>");
      }

      else if( book == "economics" ){
         document.write("<b>Economics Book</b>");
      }

      else{
         document.write("<b>Unknown Book</b>");
      }
   //-->
</script>
```

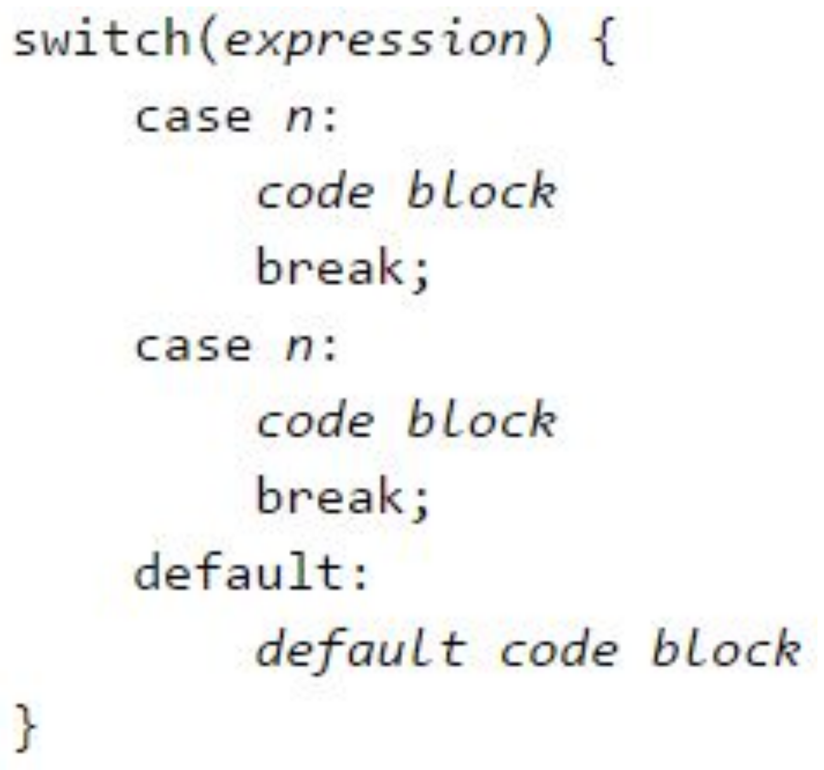


```
Maths Book
```

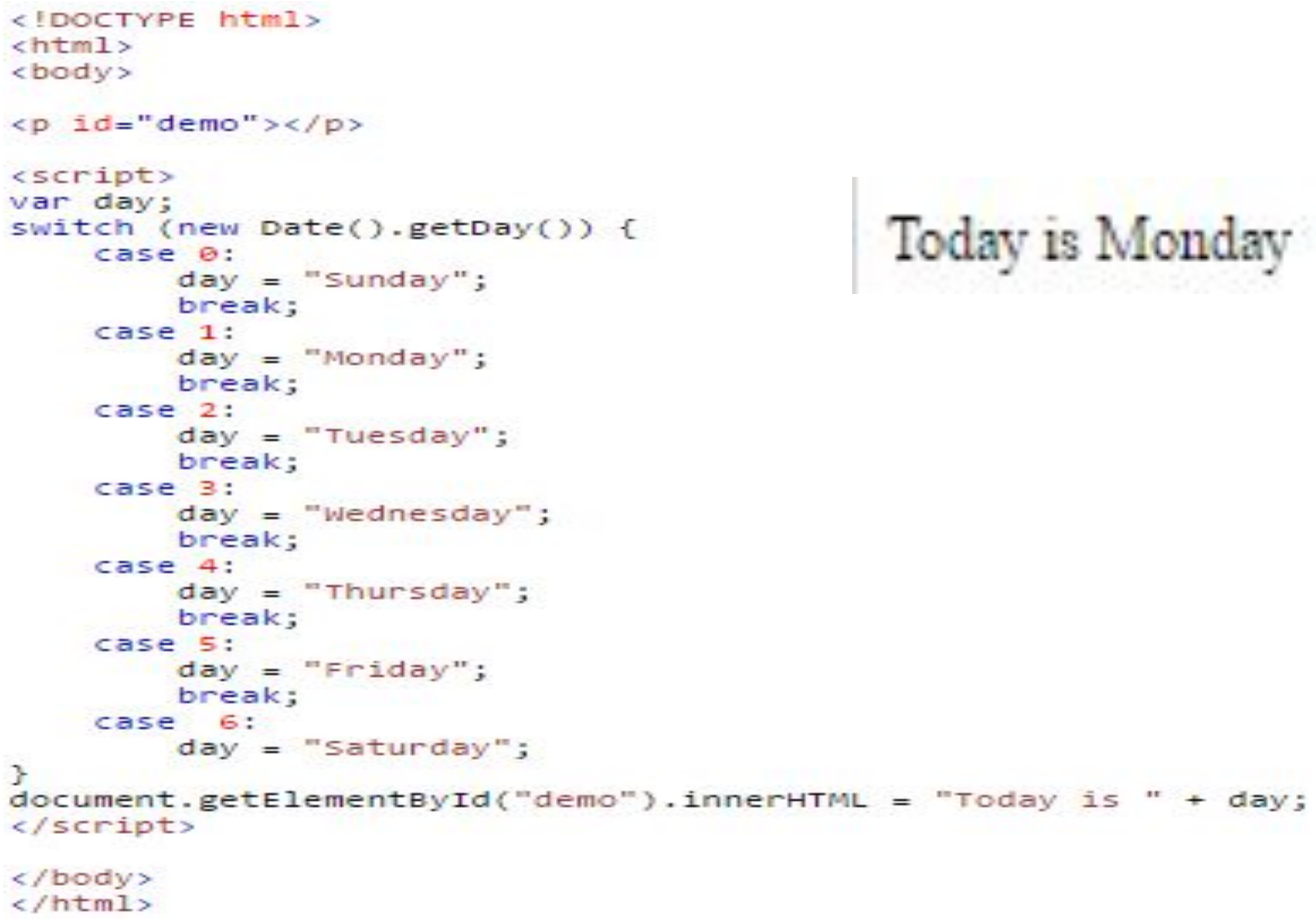
Switch Statement

- You should use the Switch statement if you want to select one of many blocks of code to be executed.

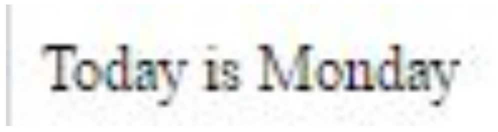
Switch statement’s syntax



```
switch(expression) {
    case n:
        code block
        break;
    case n:
        code block
        break;
    default:
        default code block
}
```



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

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

<script>
var day;
switch (new Date().getDay()) {
    case 0:
        day = "Sunday";
        break;
    case 1:
        day = "Monday";
        break;
    case 2:
        day = "Tuesday";
        break;
    case 3:
        day = "Wednesday";
        break;
    case 4:
        day = "Thursday";
        break;
    case 5:
        day = "Friday";
        break;
    case  6:
        day = "Saturday";
}
document.getElementById("demo").innerHTML = "Today is " + day;
</script>

</body>
</html>
```



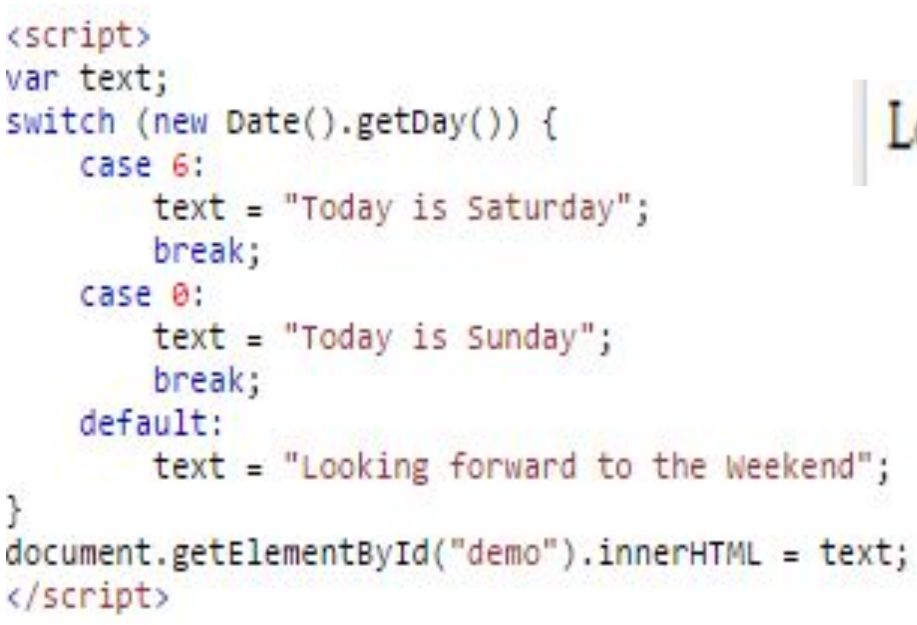
```
Today is Monday
```

The break Keyword

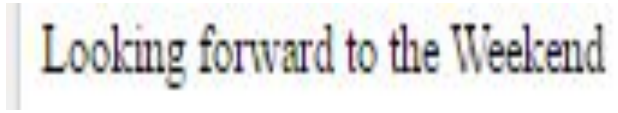
- When JavaScript reaches a **break** keyword, it breaks out of the switch block.
- This will stop the execution of more code and case testing inside the block.
- When a match is found, and the job is done, it's time for a break. There is no need for more testing

The default Keyword

- The **default** keyword specifies the code to run if there is no case match:



```
<script>
var text;
switch (new Date().getDay()) {
    case 6:
        text = "Today is Saturday";
        break;
    case 0:
        text = "Today is Sunday";
        break;
    default:
        text = "Looking forward to the Weekend";
}
document.getElementById("demo").innerHTML = text;
</script>
```



```
Looking forward to the Weekend
```

JavaScript Math Objects

- allows you to perform mathematical tasks on numbers
- **Math.round(x)** returns the value of x rounded to its nearest integer
- Math.round(4.7);   // returns 5
  Math.round(4.4);   // returns 4:
- **Math.pow(x, y)** returns the value of x to the power of y:
- Math.pow(8, 2);   // returns 64
- **Math.sqrt(x)** returns the square root of x:
- Math.sqrt(64);   // returns 8
- **Math.abs(x)** returns the absolute (positive) value of x:
- Math.abs(-4.7);   // returns 4.7
- **Math.ceil(x)** returns the value of x rounded **up** to its nearest integer:
- Math.ceil(4.4);   // returns 5
- **Math.floor(x)** returns the value of x rounded **down** to its nearest integer:
- Math.floor(4.7);   // returns 4
- **Math.min() and Math.max()** can be used to find the lowest or highest value in a list of arguments:
- Math.min(0, 150, 30, 20, -8, -200); // returns -200
- Math.max(0, 150, 30, 20, -8, -200); // returns 150
- **Math.random()** returns a random number between 0 (inclusive), and 1 (exclusive):
- Math.random();

Math Properties (Constants)

```
Math.E        // returns Euler's number
Math.PI       // returns PI
Math.SQRT2    // returns the square root of 2
Math.SQRT1_2  // returns the square root of 1/2
Math.LN2      // returns the natural logarithm of 2
Math.LN10     // returns the natural logarithm of 10
Math.LOG2E    // returns base 2 logarithm of E
Math.LOG10E   // returns base 10 logarithm of E
```

JavaScript Random Integers

- Math.random() used with Math.floor() can be used to return random integers.
- Math.floor(Math.random() * 10); //returns a number between 0 and 9

Home work: read Chapter 15