



# Digital Systems

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11.1 Logical Operators and Conditional Logic

**FOX**  
**MIS**

Relational Operators

Logical Operators

Operator	When it is true...
==	If the first expression evaluates to something that is equal to the second expression.
>=	If the first expression evaluates to something that is greater or equal to the second expression
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<=	If the first expression evaluates to something that is lesser or equal to the second expression
<	If the first expression evaluates to something that is less than the second expression
!=	If the first expression evaluates to something that is not equal to the second expression
&&	If the first expression and the second expression both evaluate to true
	If either the first expression or the second expression evaluate to true
!	Flips the value from false to true or true to false

Relational Operators

Logical Operators

# Relational Operators

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Relational Operators

# Relational Operators

Java Operator	Mathematics Symbol	Name	Example (radius is 5)	Result
<	<	less than	<code>radius &lt; 0</code>	<code>false</code>
<=	≤	less than or equal to	<code>radius &lt;= 0</code>	<code>false</code>
>	>	greater than	<code>radius &gt; 0</code>	<code>true</code>
>=	≥	greater than or equal to	<code>radius &gt;= 0</code>	<code>true</code>
==	=	equal to	<code>radius == 0</code>	<code>false</code>
!=	≠	not equal to	<code>radius != 0</code>	<code>true</code>

# Relational Operators

The result of the comparison is a *Boolean value*: **True** or **False**

Java Operator	Mathematics Symbol	Name	Example (radius is 5)	Result
<	<	less than	<code>radius &lt; 0</code>	<code>false</code>
<=	≤	less than or equal to	<code>radius &lt;= 0</code>	<code>false</code>
>	>	greater than	<code>radius &gt; 0</code>	<code>true</code>
>=	≥	greater than or equal to	<code>radius &gt;= 0</code>	<code>true</code>
==	=	equal to	<code>radius == 0</code>	<code>false</code>
!=	≠	not equal to	<code>radius != 0</code>	<code>true</code>

# Conditional Expressions

```
lastName == "Hopper"
```

```
testScore == 10
```

```
firstName != "Grace"
```

```
months != 0
```

```
testScore > 100
```

```
age < 18
```

```
distance >= limit
```

```
stock <= reorder_point
```

```
rate / 100 >= 0.1
```

Expressions evaluate to true or false.



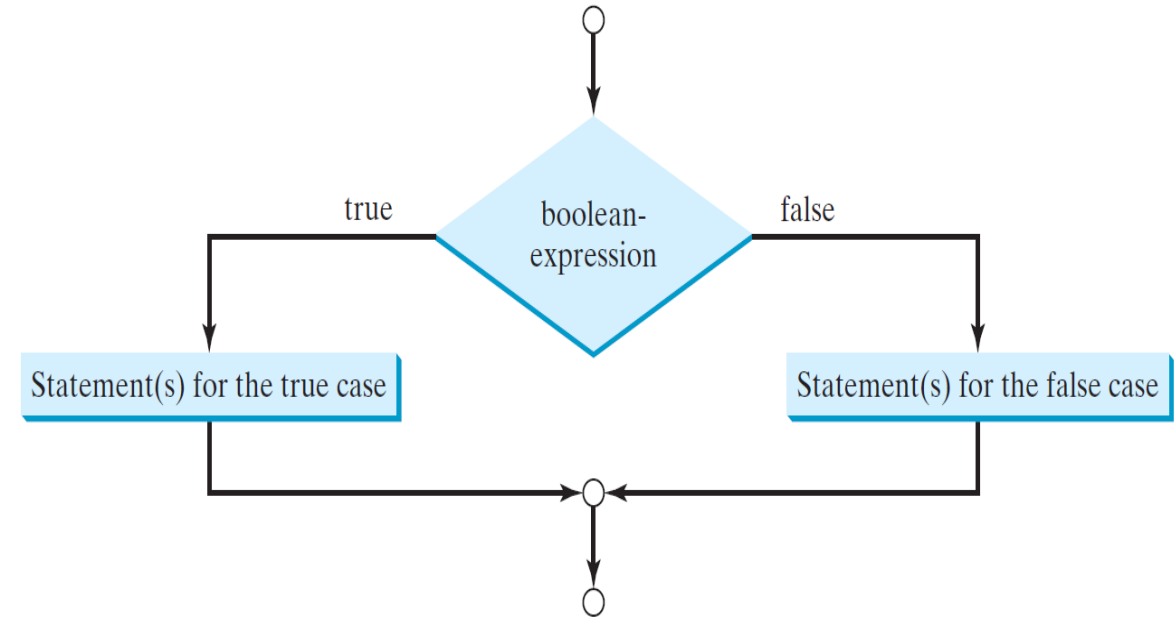
# If-else Statements

**If and Else** statements allow you to run some code based on whether a condition is **true** or **false**.

can be any expression that evaluates to a true or false



```
if (something_is_true) {  
    do_something;  
} else {  
    do_something_different;  
}
```



Source: JavaScript Absolute Beginner's Guide by Kirupa Chinnathambi

# Hello World!

(now with conditional logic)

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Classroom Challenge

# What gets displayed now?

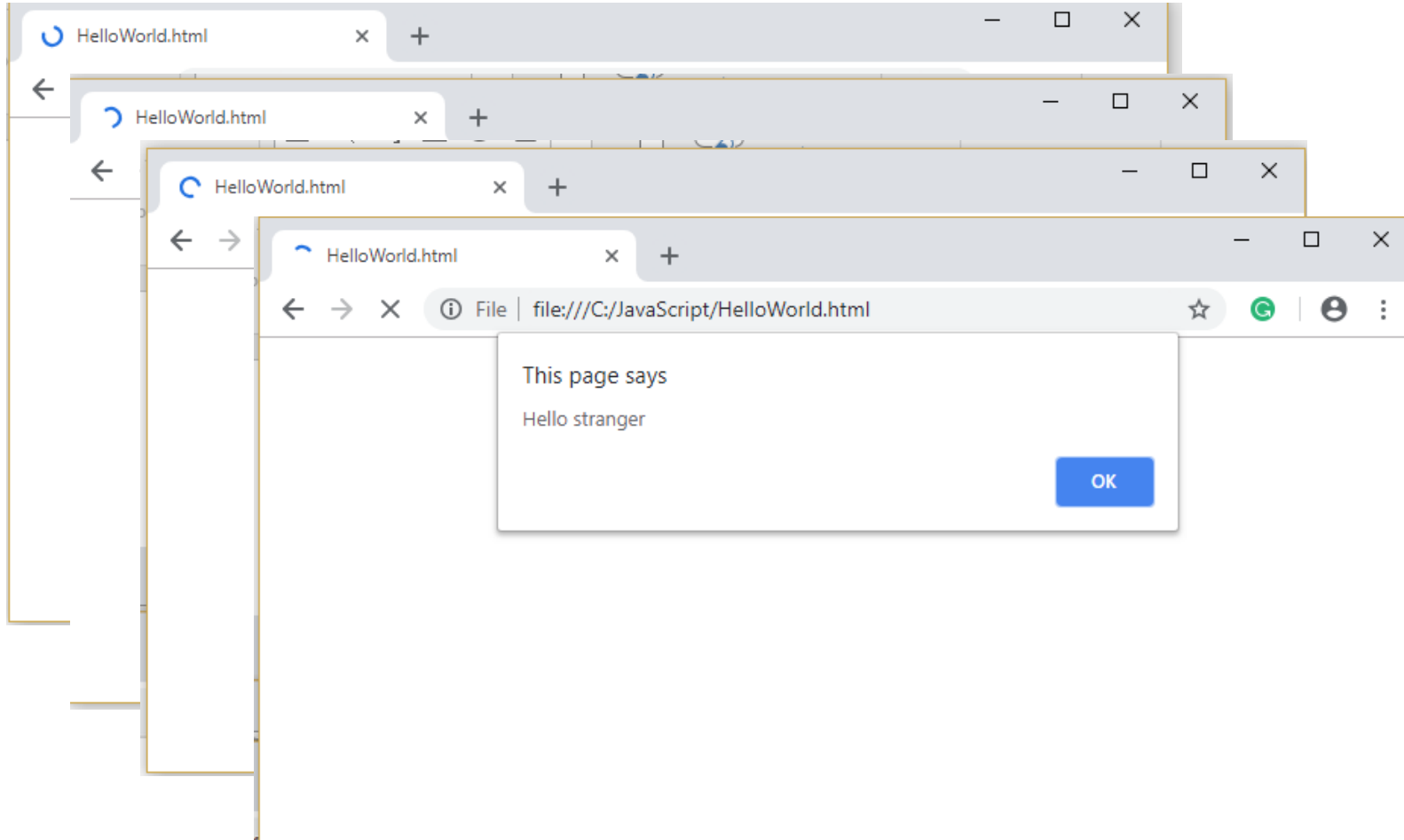
An “if” statement with a Boolean (true/false) expression

...what we do if the Boolean expression is true

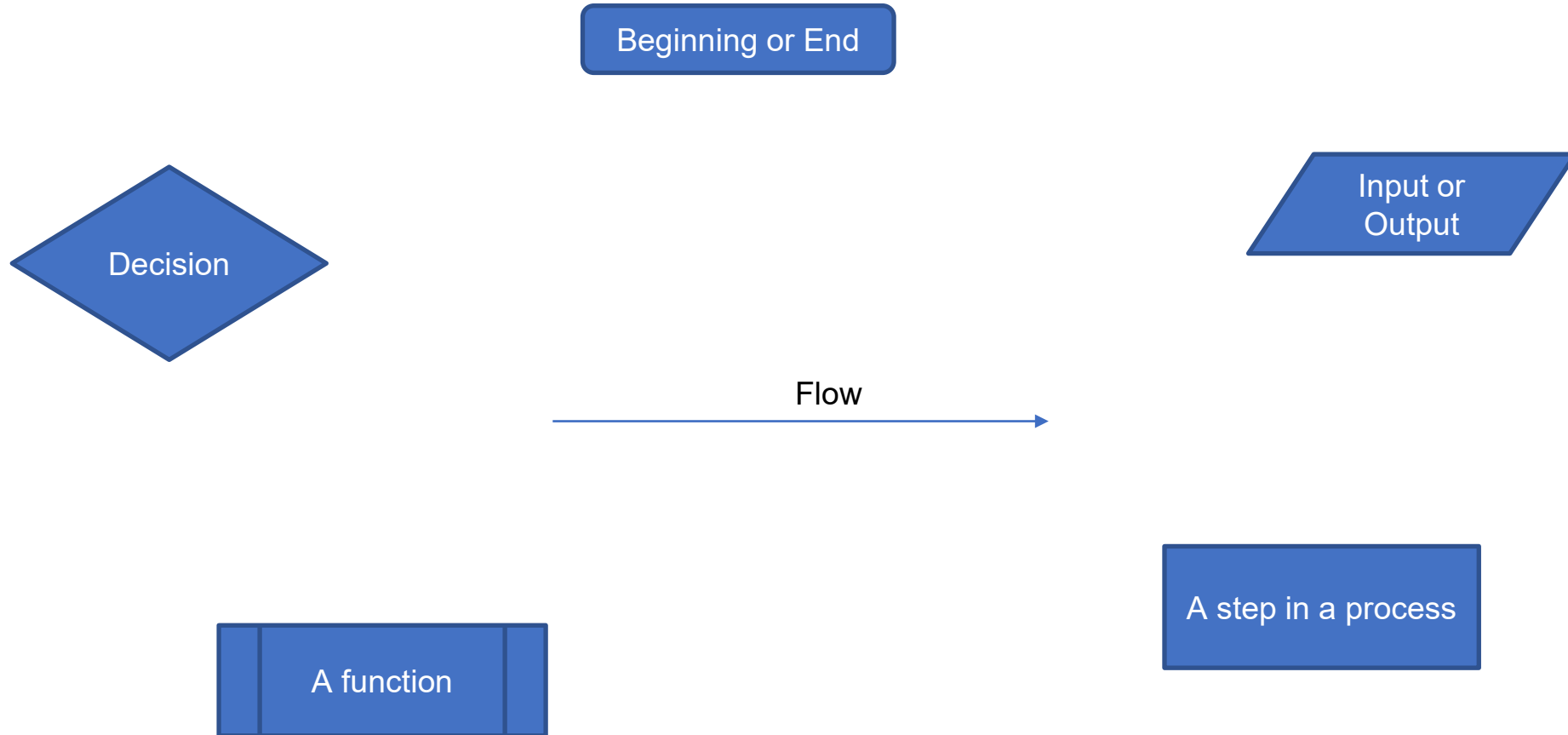
...what we do if the Boolean expression is false

```
24 let name = prompt("What is your name?");
25
26 if (name != "") {
27
28     alert('Hello ' + name);
29
30 } else {
31
32     alert('Hello stranger');
33 }
```

# Fancy Hello World! or Hello Stranger



# Flowcharts

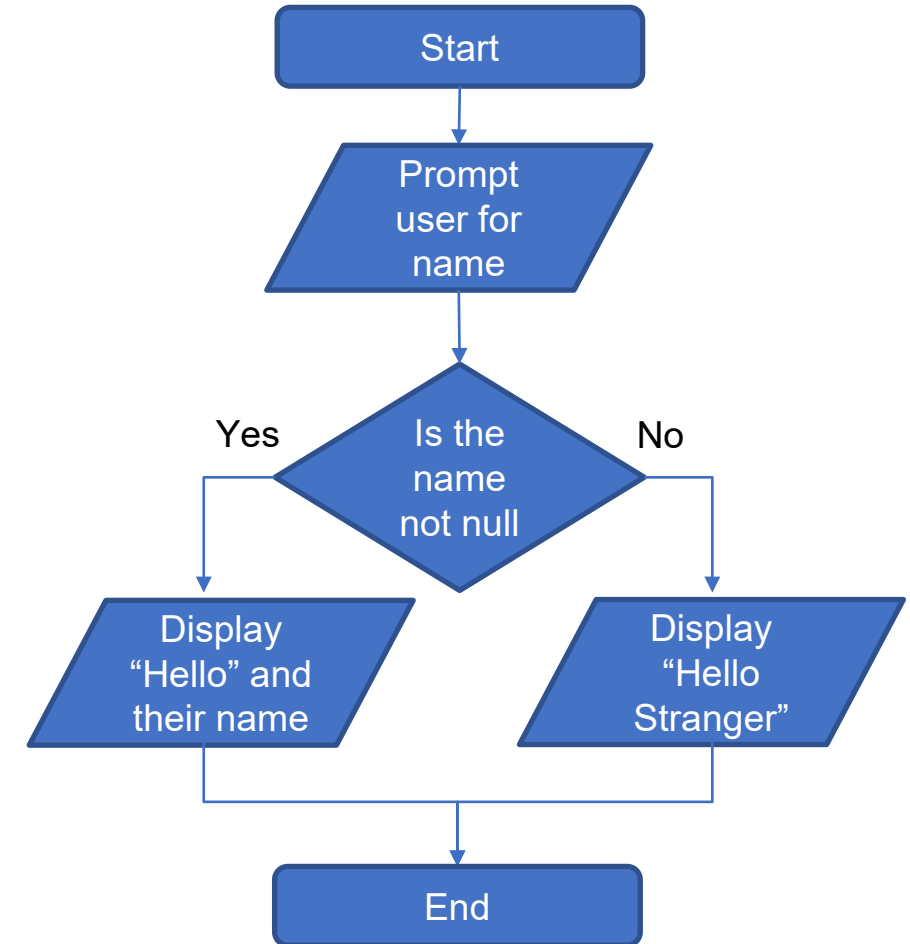


# Hello World

## Step #1 – Understand the Problem

Prompt the user for their name. If the user enters their name then display the message “Hello” and their name. If the user does not enter their name then display the message “Hello Stranger”

## Step #2 – Develop the Algorithm





# Practice, Practice, Practice

Open HelloWorld2.html and start coding!

```
24 let name = prompt("What is your name?");
25
26 if (name != "") {
27     alert('Hello ' + name);
28 } else {
29     alert('Hello stranger');
30 }
31
32
33
```

# Handy Boolean Expression

## The syntax of the global isNaN method

```
isNaN(expression)
```

### Examples of the isNaN() method

```
isNaN("Hopper")    // Returns true
```

```
isNaN("123.45")    // Returns false
```

isNaN() is a global method. The term “global” means it is available everywhere in your JavaScript code. Global methods are also sometimes called functions.

# Logical Operators

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} Logical Operators

```
if (expression operator expression) {  
    do_something;  
} else {  
    do_something_different;  
}
```

Source: JavaScript Absolute Beginner's Guide by Kirupa Chinnathambi

# Conditional expressions with logical operators

## Example 1: The AND operator

```
age > 17 && score < 70
```

## Example 2: The OR operator

```
isNaN(rate) || rate < 0
```

## Example 3: The NOT operator

```
!isNaN(age)
```

Expressions evaluate to true or false.

What do each of these expressions evaluate to?

# Putting conditional expressions to work!

## The syntax of the if statement

```
if ( condition-1 ) { statements }  
[ else if ( condition-2 ) { statements }  
  ...  
  else if ( condition-n ) { statements } ]  
[ else { statements } ]
```

## An if statement

```
if ( age >= 18 ) {  
    alert ("You may vote.");  
}
```

# Examples of using if/else clauses

## An if statement with an else clause

```
if ( age >= 18 ) {  
    alert ("You may vote.");  
} else {  
    alert ("You are not old enough to vote.");  
}
```

## An if statement with multiple else clauses

```
if ( isNaN(rate) ) {  
    alert ("You did not provide a number for the rate.");  
} else if ( rate < 0 ) {  
    alert ("The rate may not be less than zero.");  
} else if ( rate > 12 ) {  
    alert ("The rate may not be greater than 12.");  
} else {  
    alert ("The rate is: " + rate + ".");  
}
```



# An Example

```
let speedLimit = 55;

function amISpeeding(speed) {
  if (speed >= speedLimit) {
    alert("Yes. You are speeding.");
  } else {
    alert("No. You are not speeding. What's wrong with you?");
  }
}

amISpeeding(53);
amISpeeding(72);
```

# if and else statement just another example!

```
let xPos = 300;
let yPos = 150;

function sendWarning(x, y) {
    if ((x < xPos) && (y < yPos)) {
        alert("Adjust the position");
    } else {
        alert("Things are fine!");
    }
}

sendWarning(500, 160);
sendWarning(100, 100);
sendWarning(201, 149);
```

Need to add animations

Your **if** and **else** statements can be nested to help you simulate more complex situations!

```
1  <!DOCTYPE html>
2  <html>
3  <head>
4  |   <title> JavaScript nested is/else Statement </title>
5  </head>
6  <body>
7  <script>
8
9  let age = 70;
10 if (age < 18) {
11   alert('You are a Minor and Not Eligible to Work');
12
13 }else{
14
15   if(age >= 18 && age <= 65) {
16     alert('You are Eligible to Work. Please apply');
17   }
18   else {
19     alert("You've reached retirement! Please collect your pension!");
20   }
21 }
22 </script>
23 </body>
24 </html>
```

# More Practice!

## Boolean Values: true and false

- Open age.html and start coding

```
1  <!DOCTYPE html>
2  <html>
3  |
4  |     <title> Sclarow </title>
5  |
6  | <body>
7  | <script>
8  |
9  |     function oldEnough(yourAge){
10 |
11 |         if(yourAge >=21){
12 |             return true
13 |         }else{
14 |             return false
15 |         }
16 |
17 |     }
18 |
19 |
20 |     let yourAge = parseInt(prompt("How old are you?"));
21 |     if (oldEnough(yourAge)){
22 |         alert("You can drink!");
23 |     }else{
24 |         alert("It's chocolate milk for you!");
25 |     }
26 |
27 | </script>
28 | </body>
29 | </html>
```



# TIPS FROM MIS 2101 VIRTUAL HELPDESK

[Don't Fall Behind with Jackson  
Randolph](#)



**Time for  
“Challenges”!**

# Challenges

- **GuessANumber**
- **DayOfTheWeek**
- **AreasOfRectangles**
- **AgeClassifier**
- **RomanNumerals**
- **MassAndWeight**

# Homework

- **Review Riley's Ranking Calculator:**
  - Let's look at the 3<sup>rd</sup> function together
  - function `calculateInvestorRanking(investmentAmount, annualIncome, assets, debts)`



# Diamond Peer Teacher Lauren Quinn

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[Guess a Number Intro Walkthrough](#)

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[Debugger Video 2 \(Developer Tools Console\)](#)

**FOX**  
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[Debugger Video 3 \(Developer Tools Breakpoints\)](#)

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**MIS**

# Diamond Peer Teacher

# Ariella Izbinsky

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[Roman Numerals Walkthrough](#)

**FOX**  
**MIS**

# Diamond Peer Teacher Anna Boykis

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[Mass and Weight Walkthrough](#)

**FOX**  
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[Money Counting Game Walkthrough](#)

**FOX**  
**MIS**

# Diamond Peer Teacher Quinten Powers

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[Color Mixing Walkthrough](#)

**FOX**  
**MIS**

# Diamond Peer Teacher Anna Boykis

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[Hot Dog Calculator Walkthrough](#)

**FOX**  
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# More to Come

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Prepare with Readings & Videos before our next class!!!