Logical Expressions
Used to Control Program Flow:

\[ \text{if}, \quad \text{else if}, \quad \text{and} \quad \text{else} \]

Instructor: Joel Castellanos
E-mail: joel@unm.edu
Web: http://cs.unm.edu/~joel/
Office: Electrical and Computer Engineering (ECE)
Room 233

JavaScript Console

Between two numbers, the + operator tells JavaScript to add.

Between a number and a string or between two strings, the + operator tells JavaScript to concatenate.

Both + operators have the same order of operation. Therefore the left most + happens first. Since this first + is between a string and a number, the number is converted to a string and the + is concatenation.

The ( ) changes the order of operations.
JavaScript Modulus operator: %

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5 % 2</td>
<td>2 % 5</td>
<td>22 % 5</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6 % 2</td>
<td>20 % 5</td>
<td>99 % 3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6 % 0</td>
<td>21 % 5</td>
<td>101 % 3</td>
</tr>
<tr>
<td>NaN</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Numerical verses Logical Expressions

A Numerical expression evaluates to a number.

A Logical expression evaluates to `true` or `false`.

A Logical expression can contain a numerical expression
In JavaScript, `===` is a logical operator that tests for equality of the left and right side.

`==` is a logical operator that if the left and right are not the same data type, then before testing for equality, JavaScript will try to "cast" one of the types into the other.

Quiz: What is displayed in the Console

```javascript
var a = 10;
var b = 13;
a = a + 1;
if (b > a)
{
    a = a + 7;
}
else if (b > 10)
{
    b = b - 5;
}
console.log(a + "", " + b);
```

- a) 18, 13
- b) 18, 8
- c) 26
- d) 17, 8
- e) 25
Quiz: What is displayed in the Console

```javascript
var x = 5;
var z = 8;
x = x + 1;
if (x > z)
{
    x = x + 2;
}
else if (z > 5)
{
    z = z - 4;
}
console.log(x + " , " + z);
```

Quiz: What is displayed in the Console

```javascript
var x = 5;
var z = 8;
x = x + 1;
if (x < z)
{
    x = x + 2;
}
else if (z > 5)
{
    z = z - 4;
}
console.log(x + " , " + z);
```
Quiz: What is displayed in the Console

```javascript
var x = 5;
var z = 8;
if (x > z)
{
    x = x + 2;
    x = x + 1;
}
else if (z > 5)
{
    z = z - 4;
}
console.log(x + ", " + z);
```

Answer choices:
a) 6, 1  
b) 8, 8  
c) 6, 8  
d) 5, 4  
e) 6, 6

---

Quiz: What is displayed in the Console

```javascript
var x = 5;
var z = 3;
if (x + z === 8)
{
    x = x + 2;
    x = x + 1;
}
else if (z < 5)
{
    z = z - 1;
}
console.log(x + ", " + z);
```

Answer choices:
a) 5, 3  
b) 6, 3  
c) 7, 2  
d) 8, 2  
e) 8, 3
Quiz: What is displayed in the Console

```javascript
var x = 5;
var z = 3;
console.log(x % 3 + " , " + z % 3);
```

a) 2, 0  
b) 5, 3  
c) 5%, 3%  
d) 0,05, 0,03  
e) 1.666667, 1