

Our example of counting vowels from last lecture:

```
var str = "Hello";
var count = 0;
while (i < str.length)
{
    var c = str.charAt(i);
    if (isVowel(c))
        count = count + 1;
    i = i + 1;
}
print("Vowels: " + count);
```

Shortcuts

We can use **shortcuts** in JavaScript to shorten some statements in the above code.

- Addition
 - $x = x + 4$; can be written as $x += 4$;
 - $x = x + 1$; can be written as $x += 1$; or even more simply, $x++$;
- Subtraction
 - $x = x - 4$; can be written as $x -= 4$;
 - $x = x - 1$; can be written as $x -= 1$; or even more simply, $x--$;
- Multiplication
 - $x = x * 4$ can be written as $x *= 4$;
 - $x**$ makes no sense, so it is not valid
- Division
 - $x = x / 4$ can be written as $x /= 4$;
 - $x//$ also makes no sense, so it is not valid

for loops

We can also use another type of **looping structure** other than the while loop, called the **for loop**.

- Motivation: when programming, we often want to loop through a range of numbers; this can be awkward with a while loop, especially if the "i++;" statement is forgotten as that error leads to an infinite loop.

The **for loop** structure is as follows:

```
for (var i = 0; i < 10; i++)
{
    do something ...
}
```

// var i = 0 declares/initializes the variable
// i < 10 is the while condition
// i++ increments i after each iteration of the loop.

In **pseudocode**, for loops can be translated in English as "for each <x> in <y> ..."

A common example: for each character in our string ...

```
for (var i = 0; i < s.length; i++)  
{  
    do something ...  
}
```

Example: how many times do we see "e" in a given string?

```
var s = "Hello";
```

```
// set counter = 0
```

```
var counter = 0;
```

```
// for each character in our string:
```

```
for (var i=0; i < s.length; i++)
```

```
{
```

```
    // if the character is an "e":
```

```
    if (s.charAt(i) == "e")
```

```
    {
```

```
        // add one to counter
```

```
        counter++;
```

```
    }
```

```
}
```

```
// print the number of e's
```

```
print("Number of e's: " + counter);
```

Arrays

Array is a fancy name for a "list". They define list members within square brackets [].

```
var primes = [2, 3, 5, 7, 11]; // A list containing a set of the  
                                first 5 prime numbers
```

Each **element** inside a list can be any type of variable.

- Strings
- Numbers
- Other arrays, to form 2D arrays
- `var twoDArray = [ [1, 2, 3], [4, 5, 6], [7, 8, 9] ];`

Array functions

- `.length` gives the length of the array
- `var len = primes.length; // len = 5`

- Indexing into an array
- `var firstPrime = primes[0];` // accesses the first element of the array called primes;
`firstPrime = 2`
- `var secondPrime = primes[1];` // accesses second element of primes; `secondPrime = 3`

Example using arrays

```
var highTemps = [35, 20, 20, 36,  
                33, -1, 11, 21,  
                32, 41, 41, 44,  
                51 ....]; // high temperatures during January 2014  
// set counter = 0  
var counter = 0;  
// for each day:  
for(var i=0; i < highTemps.length; i++)  
{  
    // if the high temperature is <= 32:  
    if (highTemps[i] <= 32)  
    {  
        // add one to counter  
        counter++;  
    }  
}  
  
// print the number of freezing days  
print("Number of freezing days: " + counter);
```