

Higher-order Functions II



Overview

```
1  /*
2      - Returning functions from functions
3      - Closure
4  */
```



Returning values from functions

```
1  /* we know that functions can return values */
2
3  function returnsAString() {
4      return 'I am a string';
5  }
6
7  let returnedValue = returnsAString();
8
9  console.log(returnedValue);
10
11
12
13
14
```



Returning values from functions

```
1  /* in the previous unit, we learned that functions are like any other
2     value in JS */
3
4  /* so if functions can return values, and functions are values.. */
5
6  /* ...functions can return other functions! */
7
8
9
10
11
12
13
14
```



Returning functions from function

```
function  
[Function: greetMe]  
Hi!
```

```
1  function greetMe() {  
2    console.log('Hi!');  
3  }  
4  
5  function getGreeter() {  
6    return greetMe; // note: we're returning the function without calling it  
7  }  
8  
9  let greeter = getGreeter();  
10  
11 console.log(typeof greeter);  
12 console.log(greeter);  
13 greeter();  
14
```



Returning functions from function

Hi!
undefined
undefined
TypeError: greeter
is not a function

```
1 function greetMe() {  
2   console.log('Hi!');  
3 }  
4  
5 function getGreeter() {  
6   return greetMe(); // what if we did invoke it?  
7 }  
8  
9 let greeter = getGreeter();  
10  
11 console.log(typeof greeter);  
12 console.log(greeter);  
13 greeter();  
14
```



Returning functions from functions

```
1 function getGreeter() {  
2   // we can declare a new inner function and then return it  
3   function greetMe() {  
4     console.log('Hi!');  
5   }  
6  
7   return greetMe;  
8 }  
9  
10 let greeter = getGreeter();  
11 greeter();  
12  
13  
14
```



Returning functions from functions

```
1 function getGreeter() {  
2   // we can return anonymous function, too  
3   return function() {  
4     console.log('Hi!');  
5   };  
6 }  
7  
8 let greeter = getGreeter();  
9 greeter();  
10  
11  
12  
13  
14
```




Hi Marie
Hi Rosalind
Hi undefined

Returning functions from functions

```
1 function getGreeter() {  
2   // what if our returned function takes a parameter?  
3   return function(name) {  
4     console.log('Hi', name);  
5   };  
6 }  
7  
8 let greeter = getGreeter();  
9  
10 greeter('Marie');  
11 greeter('Rosalind');  
12 greeter();  
13  
14
```



Closure: scope refresher

```
1  /* before we talk about closure, let's review how scope works with nested
2     functions */
3
4  /* inner functions can access variables defined in outer functions */
5
6  function greeter() {
7     let name = 'Marie';
8     let saysHi = function() {
9         console.log('Hi', name);
10    };
11    saysHi();
12 }
13
14 greeter();
```



Closure: definition

```
1  /* closure is the fact that an inner function can STILL to access values
2     defined in the outer function even after the outer function is finished
3     running! */
4
5
6
7
8
9
10
11
12
13
14
```



getGreeter is running
getGreeter is finishing
Hi Marie

Closure: examples

```
1 function getGreeter() {  
2   console.log('getGreeter is running');  
3  
4   let name = 'Marie';  
5  
6   console.log('getGreeter is finishing');  
7  
8   return function() {  
9     console.log('Hi', name);  
10  };  
11 }  
12  
13 let greeter = getGreeter();  
14 greeter();
```



Closure: examples

```
1 // what if getGreeter take a parameter?
2 function getGreeter(name) {
3     return function() {
4         console.log('Hi', name);
5     };
6 }
7
8 let greeter = getGreeter('Rosalind');
9 greeter();
10
11
12
13
14
```



Closure: examples

```
1 // what if both functions take parameters?
2 function getGreeter(name1) {
3   return function(name2) {
4     console.log('Hi ' + name1 + ', meet ' + name2);
5   };
6 }
7
8 let greeter = getGreeter('Marie');
9 greeter('Rosalind');
10
11
12
13
14
```



Closure: examples

Hi Marie, meet Dorothy
Hi Marie, meet Albert
Hi Rosalind, meet Barbara
Hi Rosalind, meet Isaac

```
1 function getGreeter(name1) {  
2   return function(name2) {  
3     console.log('Hi ' + name1 + ', meet ' + name2);  
4   };  
5 }  
6  
7 let introduceMarieTo = getGreeter('Marie');  
8 let introduceRosalindTo = getGreeter('Rosalind');  
9  
10 introduceMarieTo('Dorothy');  
11 introduceMarieTo('Albert');  
12  
13 introduceRosalindTo('Barbara');  
14 introduceRosalindTo('Isaac');
```



Recap

```
1  /*
2      - Returning functions from functions
3      - Closure
4  */
```