**Functional Programming:**

**Basic Exercises**

**1.** Make a function called composedValue that takes two functions f1 and f2 and a value and returns

f1(f2(value)), i.e., the first function called on the result of the second function called on the value.

function square(x) { return(x\*x); }

function double(x) { return(x\*2); }

composedValue(square, double, 5); --> 100 // I.e., square(double(5))

**Sol:** square=x => x\*x;

double = x => 2\*x;

const composedValue= (fun1,fun2) =>(x) =>fun1(fun2(x));

console.log(composedValue(square,double)(5));

**2.** Make a function called compose that takes two functions f1 and f2 and returns a new function that,

when called on a value, will return f1(f2(value)). Assume that f1 and f2 each take exactly one argument.

var f1 = compose(square, double);

f1(5); --> 100

f1(10); --> 400

var f2 = compose(double, square);

f2(5); --> 50

f2(10); --> 200

**Sol:** const compose= (fun1,fun2) =>(x) =>fun1(fun2(x));

square=x => x\*x;

double = x => 2\*x;

var f1=compose(square,double);

console.log(f1(5));

console.log(f1(10));

var f2=compose(double,square);

console.log(f2(5));

console.log(f2(10));

**3.** Make a function called “find” that takes an array and a test function, and returns the first element of

the array that “passes” (returns non-false for) the test. Don’t use map, filter, or reduce.

function isEven(num) { return(num%2 == 0); }

isEven(3) --> false

isEven(4) --> true

find([1, 3, 5, 4, 2], isEven); --> 4

**Sol:** //conditional function to check even

isEven = x => x%2 == 0 ? true : false;

// find takes x : array and fun : conditional function as argument.

find = function (x,fun) {

for(let i of x)

{

if(fun(i))

{

return i;

}

}

}

console.log(find([1, 3, 5, 4, 2], isEven));

**4.** Recent JavaScript versions added the “map” method of arrays, as we saw in the notes and used in

the previous set of exercises. But, in earlier JavaScript versions, you had to write it yourself. Make

a function called “map” that takes an array and a function, and returns a new array that is the result

of calling the function on each element of the input array. Don’t use map, filter, or reduce.

map([1, 2, 3, 4, 5], square); --> [1, 4, 9, 16, 25]

map([1, 4, 9, 16, 25], Math.sqrt); --> [1, 2, 3, 4, 5]

Hint: remember the push method of arrays.

**Sol:** //function to return square of function

square = x => x\*x;

// find takes x : array and fun : a funtion

//it performs the task defined in fun on every elemenr and returns the result as new array

map = function (x,fun) {

let ar=[];

for(let i of x)

{

ar.push(fun(i));

}

return ar;

}

var array = [1, 3, 5, 4, 2];

// calling map with square function

console.log(map(array, square));

//Original array is unaltered

console.log("Original : "+array);

// calling map with Math library sqrt function

console.log(map(1, 4, 9, 16, 25, Math.sqrt));

**Functional Programming:**

**Advanced Exercises**

**1.** Make a “pure” recursive version of find. That is, don’t use any explicit loops (e.g. for loops or the

forEach method), and don’t use any local variables (e.g., var x = ...) inside the functions. Hint:

remember the slice method of arrays.

function isEven(num) { return(num%2 == 0); }

isEven(3) --> false

isEven(4) --> true

find([1, 3, 5, 4, 2], isEven); --> 4

**Sol:** // A function to check a number is even or odd

isEven = x => x%2 == 0 ? true : false;

// replica of find function with recursion

// return the element which satisfies the condition

// if no element satify returns -1

function find(x,fun){

if(x.length == 0 )

{

return -1;

}

if(fun(x[0]))

return x[0];

else{

return find(x.slice(1),fun);

}

}

console.log(find([1, 3, 5, 4, 2], isEven));

**2.** Make a “pure” recursive version of map. Hint: remember the slice and concat methods of arrays.

map([1, 2, 3, 4, 5], square); --> [1, 4, 9, 16, 25]

map([1, 4, 9, 16, 25], Math.sqrt); --> [1, 2, 3, 4, 5]

**Sol:** // A function to return square of parameter

square = x => x\*x;

// Replica of map function : Operate every element of array with given function and returns new array

function map(x,fun){

if(x.length == 0 )

{

var ar = [];

return ar;

}

var ar = map(x.slice(1),fun);

ar.unshift(fun(x[0]));

return ar;

}

console.log(map([1, 3, 5, 4, 2], square));

console.log(map([1, 4, 9, 16, 25], Math.sqrt));

**3.** JavaScript lets you define anonymous functions and call them right on the spot. For example,

(function(x) { return x\*x; })(5) returns 25. Also, if you concatenate a string with a function, the

result is a string that looks more or less like the function definition. For example:

function square(x) { return x\*x; }

"square is " + square

--> "square is function square(x) { return x \* x; }"

Use these ideas to make an anonymous function call that outputs a string, where inside that string is

exactly what was typed in as the function call. I.e., you go to the Firebug console and type in

(function(...) {something})(blah)

and get back

"(function(...) {something})(blah)"

The return value should be *exactly* what you typed in, except that it has quotes around it, and it is

OK if the whitespace (spaces, carriage returns) in the return value is not exactly the same as in the

input. To make it even harder, you are not allowed to use arguments.callee or the arguments array at

all. It can be done with “function”, “return”, a variable name, parens, curly braces, and double

quotes: no obscure JavaScript feature (or anything else at all!) is needed.

**Sol:** var input = prompt("Enter function");

function functionPrint(){

console.log(input);

}

functionPrint();