Functional Programming For React

Today's Quote By Tanay

Be lazy ⇒ No knowledge by reading or writing ⇒ No wealth ⇒ No Friends

Functions are first class citizens

1. It can be assigned to variables
2. sent to other functions as arguments
3. can be added to objects
4. can be added to arrays as well
5. can be returned from other functions

NOTE: Anything which we can do with variable, function can do the same.

Declarative Programming

1. FP is a part of a larger programming paradigm
2. ***Instead*** of saying ***how it should happen***, ***what should happen***.
3. We have seen how React abstracts away DOM creation.
4. React is an awesome explanation of DP.

Why FP?

1. Does not depend on global variables
    a. Hence, less bugs
2. More code reuse
3. Easier to understand and read
4. Super easy to test

How to do Functional Programming?

Immutability

Properties

1. ***Do not change any data. Always return a new copy***
2. In Javascript, function arguments are references to the actual data.
    a. if you change the parameter itself (as with `num` and `obj2`), that won't affect the item that was fed into the parameter. But if you change the *internals* of the parameter, that will propagate back up

```
function changeStuff(a, b, c) { a = a * 10; b.item = "changed"; c = {item: "changed"}; } var num = 10; var obj1 = {item: "unchanged"}; var obj2 = {item: "unchanged"}; changeStuff(num, obj1, obj2); console.log(num); console.log(obj1.item); console.log(obj2.item);
```

Question

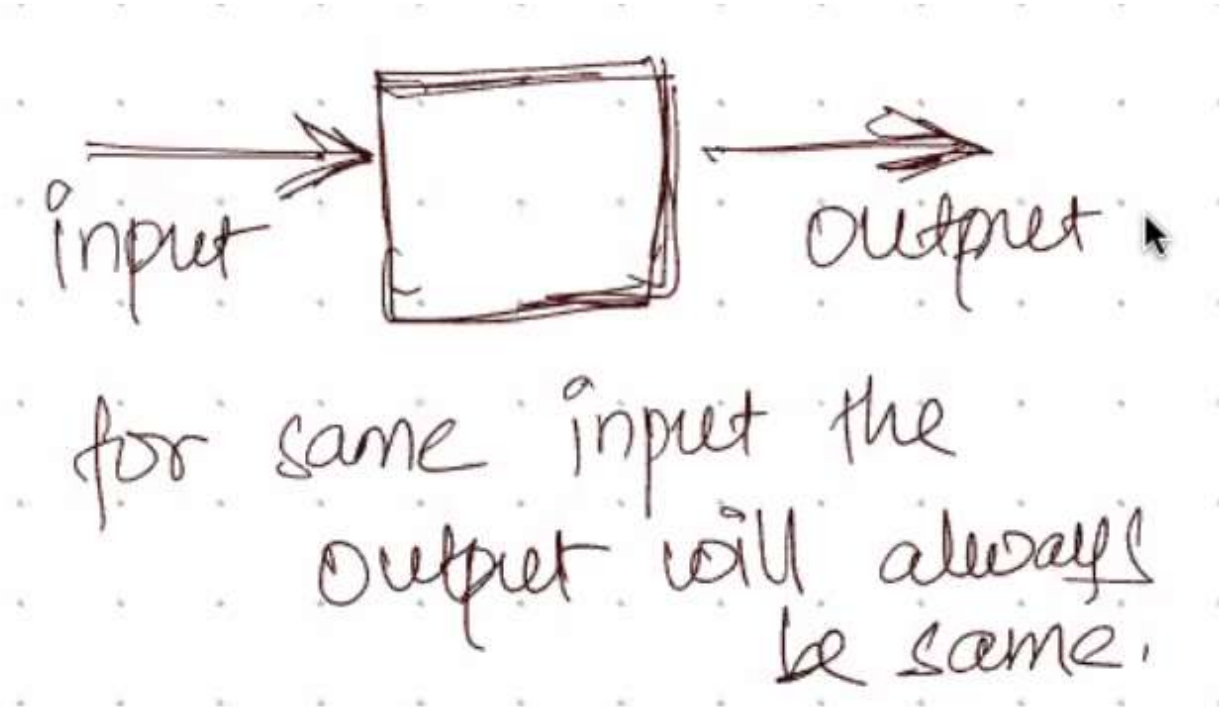
1. Take an object with you mother's name and your age. Now, create an obj for your sibling by age difference.

```
const tanay = { mother: "x", age: 22 }; NOTE: "=" creates a reference. Deep Copy and Shallow Copy are different. const tanvi = tanay; tanvi.age = tanay.age - 4; console.log(tanay === tanvi);
```

2. Take an array with 5 colors. Create another array by adding two more colors to it

```
const arr = ["a", "b", "c", "d", "e"]; const narr = [ ...arr, "f", "g" ];
```

Pure Functions



3 rules

1. at least one argument
2. return a value or other function
3. ***should not mutate any of its argument***.

Question

Write a function birthday() to take a person's name and age in an object and increase age

```
const birthday = (personInfo) => { return { ...personInfo, age:
personInfo.age + 3 }; };
```

This is wrong.. Curly Braces and return.. Not practiced ES6 ;-;;

```
const birthday = personInfo => { ...personInfo, age: personInfo.age + 3 };
```

This is wrong... We missed Parentheses in returning

```
const birthday = (personInfo) => ({ ...personInfo, age: personInfo.age + 3
});
```

Higher Order Functions

Properties

1. Can take functions as arguments
2. Return functions
3. Can do both.

Example

Array.filter is a higher order function.

Question

1. Write a function which can tell whether a number is less than 10 or not. Supply this function to Array.filter() to get an array with no 10s in it.

```
function isLessThan10 = (number) => (number < 10); const arr = [9, 10, 11];
arr.filter(isLessThan10);
```

NOTE: We have abstracted away. It is declarative + more readable.

2. Given an array of numbers, return an array with all numbers incremented by 2.

```
const incrementByTwo = num => num + 2; numbers.map(incrementByTwo);
```

Is map/filter a pure function or not? ⇒ Its pure.

because does not mutate, creates a new array.

and returns a value/function.

When to validate arguments in a function?

⇒ Whenever it is coming from outside of our program, we need to validate it.

Example: Local Storage, API, etc

ES6 Methods

[ ].map(fn)

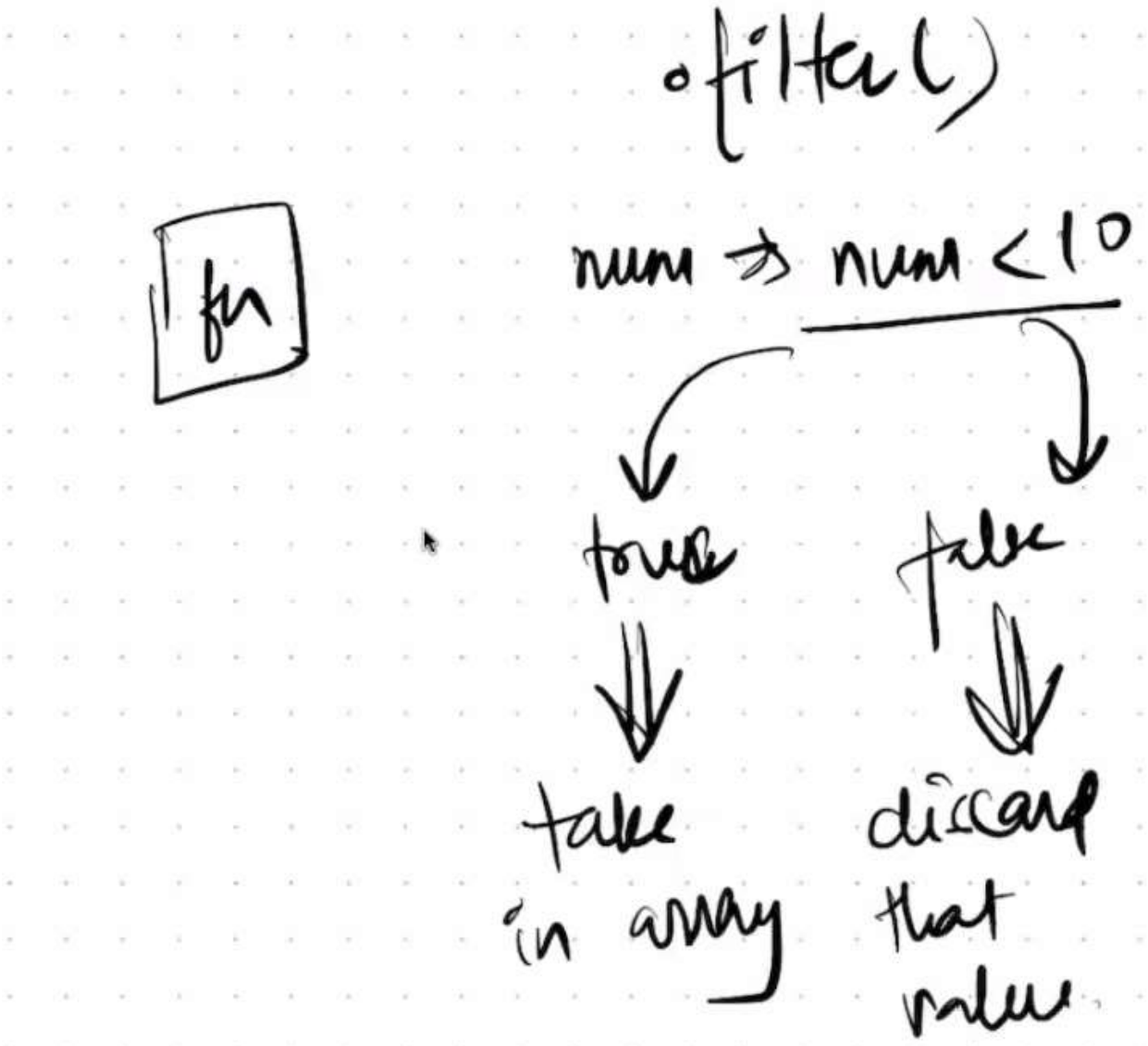
1. Returns a new array
2. Modifies each element ⇒ Must return a value

```
arr.map( (value, index) => );
```

[ ].filter(fn)

Returns a new array

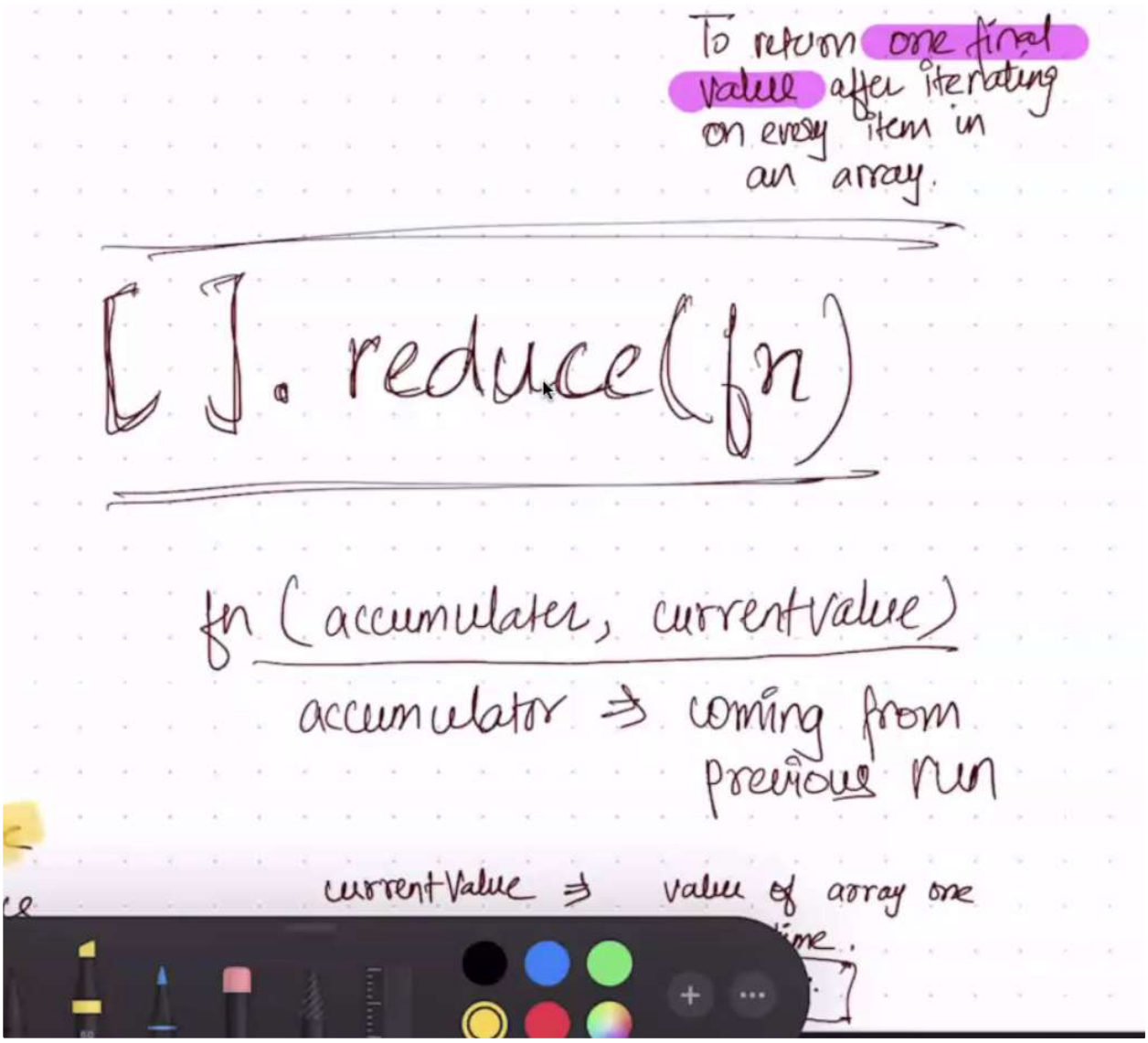
Condition check on each element



[ ].reduce(fn, [initialValue])

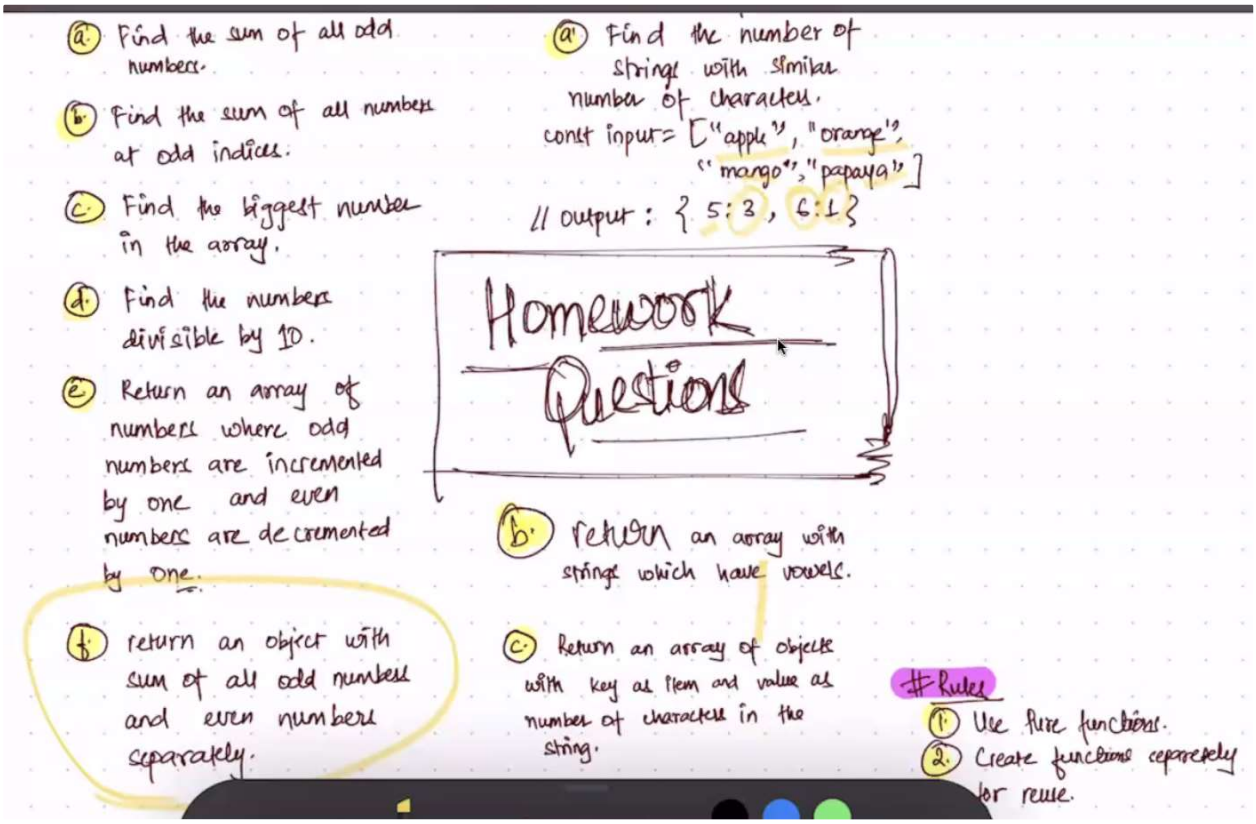
Properties

1. *fn ⇒ should be pure.*



HW: Can you write your own reduce using for loop.

HW Questions



IMP: My mistake

My Code

```
const sumOfAllOddNumbers = (accumulator = 0, value) => { if (value % 2)
accumulator += value; return accumulator; } [1, 3, 5, 2, 22, 11,
9].reduce(sumOfAllOddNumbers); const sumOfAllOddNumbersObject = (accumulator
= { oddSum: 0, evenSum: 0}, value) => { if (value % 2) accumulator.oddSum +=
value; else accumulator.evenSum += value; return accumulator; } // this
doesnt Work ;---; // Because, I MUTATEDDDD.... [1, 3, 5, 2, 22, 11,
9].reduce(sumOfAllOddNumbersObject);
```

Tanay's Code:

```
const numbers = [1, 3, 5, 2, 22, 11, 9]; const oddSum = (sum, num) => num % 2 === 0 ? sum : sum + num; //now Testing becomes easier oddSum(11, 3) => 14 oddSum(2, 4) => 2 numbers.reduce(oddSum, 0); //NOTEEEE: PURE Functionn inside reduce const reduceObj = (oddEvenObj, num) => num % 2 === 0 ? { ...oddEvenObj, even: oddEvenObj.even + num } : { ...oddEvenObj, odd: oddEvenObj.odd + num } const oddEvenObj = { even: 0, odd: 0 }; numbers.reduce(reduceObj, oddEvenObj);
```

HW Answers

a. Done above

b. List

```
const sumAtOddIndex = (sum, value, index) => index % 2 === 1 ? sum + value : sum; [].reduce(sumAtOddIndex, 0);
```

c.

```
const biggestNumberInArr = (big, value) => Math.max(big, value); [].reduce(biggestNumberInArr, Number.NEGATIVE_INFINITY);
```

d.

```
const isDivisibleBy10 = value => value % 10 === 0; [].filter(isDivisbleBy10);
```

e.

```
const increaseOddDecreaseEven = value => value % 2 === 0 ? value - 1 : value + 1; [].map(increaseOddDecreaseEven);
```

f. Done above

a′:

```
const numOfStrings = (numObj, str) => numObj.hasOwnProperty(str.length) ? {
...numObj, str.length: numObj[str.length] + 1 } : { ...numObj, str.length: 1
}; [].reduce(numOfStrings, {});
```

b′:

```
const checkForVowel = (hasVowel, char) => 'aeiou'.indexOf(char) != -1 ?
hasVowel | true : hasVowel; const hasVowel = str => str.reduce(checkForVowel,
false); [].filter(hasVowel);
```

c′.

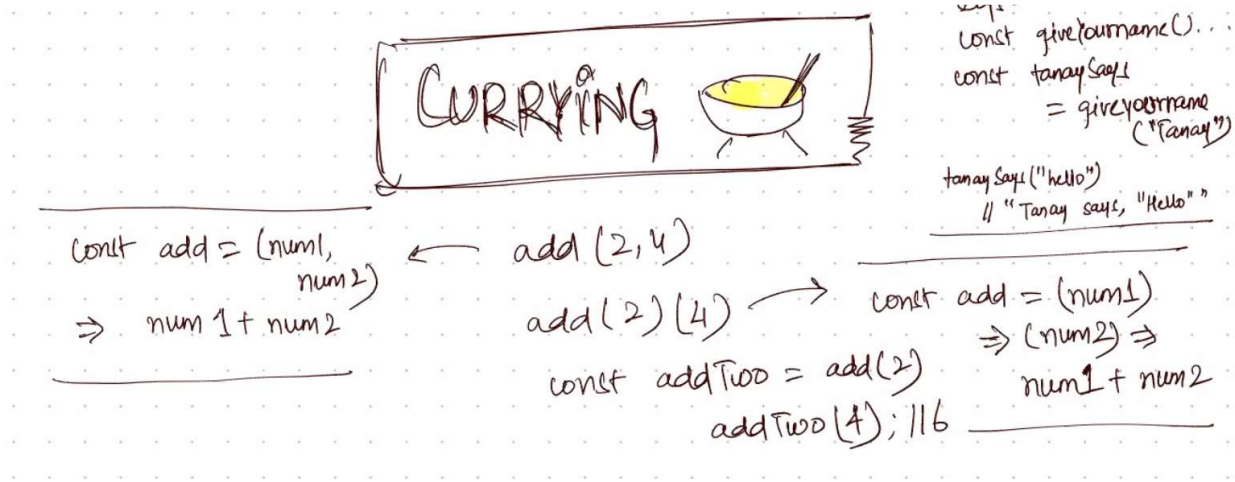
```
const createObj = str => { str: str.length }; ["tanay", "tanvi", "kishan",
"prerana"].map(createObj);
```

Currying

Properties

How this works?

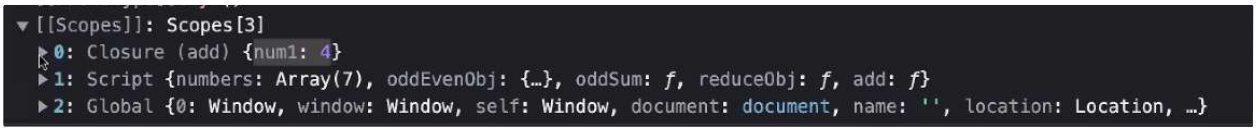
Closure makes this work....



add(2, 4) ⇒ Normal people

add(2)(4) ⇒ first function is returning a function.

```
const add = num1 => num2 => num1 + num2; const fourAdded = add(4); //
Returns: (num2 => num1 + num2;) fourAdded(2); // returns 6
```



When to use currying?

When we dont have all values of function at same time

Logger Question

```
const nameLogger = name => msg => console.log(`${name} ${str}`); const
ritikLogger = nameLogger("ritik"); const teamB1Logger = nameLogger("Team
B1");
```

Use Case

1. When there is logger, we want to attach id to the logger, from which place it came. So we use currying there to add the id to identify the place.

Composition

Output of f(x) should go to g(x). ⇒ g(f(x))

Example 1:

```
const add = (num1, num2) => num1 + num2; console.log(add(2, 3)); // Output of add is input of console.
```

Callback ⇒ Call me later, this is not callback.

Example 2:

```
const double = num => num * 2; double(add(2, 3));
```

Question

Write a function which can log any text with your username.

Write a function which can write any text with your userId.

Now compose both functions to give one function which can log any text with username and ID.

My Answer (Wrong ;-;)_

```
const getUserId = (userId) => userId; const getUserName = (userName)
=>userName; const logger = (userId, userName) => console.log(`${userId}
${userName}); logger( getUserId("123"), getUserName("ritik") );
```

Tanay's Answer

```
const logWithMyName = msg => `Tanay says, ${msg}`; const logWithMyId = msg =>
`ID: 1234 :: ${msg}`; const logWithIdAndName = msg =>
logWithMyId(logWithMyName(msg)); logWithIdAndName("We are reockstars");
```

THE ONE HOMEWORK