

National University of Singapore
School of Computing
SWS3012: Structure and Interpretation of Computer Programs
July 2023

R7B Mutable Data

Problems:

1. The following is the `make_withdraw` function shown in Lecture L7B:

```
function make_withdraw(balance) {
  function withdraw(amount) {
    if (balance >= amount) {
      balance = balance - amount;
      return balance;
    } else {
      return "Insufficient funds";
    }
  }
  return withdraw;
}
```

Modify the `make_withdraw` function so that it creates password-protected accounts. That is, for example,

```
const acc = make_withdraw(100, "my_password");
acc(30, "his_passcode"); // returns "Wrong password; no withdraw"
acc(30, "my_password");  // returns 70
```

Moreover, to further increase security, we want an account to be disabled if it has been accessed three consecutive times with incorrect passwords. For example,

```
const acc = make_withdraw(100, "my_password");
acc(30, "his_passcode"); // returns "Wrong password; no withdraw"
acc(30, "my_password");  // returns 70
acc(10, "sesame");        // returns "Wrong password; no withdraw"
acc(15, "canola");        // returns "Wrong password; no withdraw"
acc(25, "olive");         // returns "Wrong password; no withdraw"
acc(30, "my_password");   // returns "Account disabled"
acc(30, "his_passcode");  // returns "Account disabled"
```

2. Consider the following [program](#) that makes a calculator function for a final price after adding a fixed commission, considering a given tax rate. What is the result of evaluating the program?

```
let commission = 25; // my commission in dollars  
// return a calculator for total price  
// total price = (commission + cost) * (1 + tax_rate)  
function make_price_calculator(tax_rate) {  
  function calculator(cost) {  
    return (commission + cost) * (1 + tax_rate);  
  }  
  return calculator;  
}  
  
const calc = make_price_calculator(0.07);  
commission = 125;  
calc(75);
```

3. Play with for loops and while loops: Look up how they work in https://docs.sourceacademy.org/source_3/ and play with examples.