

CMSC330 Spring 2023 Quiz 5

This entire quiz pertains to the Rust Programming Language

Problem 1: Basics [4 pts]

Please circle **True** or **False** for the following statements:

Every value in rust has an owner True False

The lifetime of a value is always the same as the scope of the variable it was defined with **True False**

Rust is a memory-safe language True False

There can still be Memory Leaks in Rust

Problem 2: Lifetimes and Borrowing

[16 pts]

Version 1:

```
fn main(){
 1
        let f:
2
 3
 4
             let x = String::from("mut");
             f = &x;
 5
 6
        }
 7
8
        let c;
 9
10
             let y = String::from("hey");
             let z = "bye";
11
             let d = z;
12
             c = greethuh(y.as_str(),d);
13
        }
14
15
16
         let mut s = String::from("a");
17
         let s1 = &s;
18
         func(&mut s);
19
          println!("{}",s);
20
21
    }
22
23
    fn greethuh < 'a > (a:&'a str, b:&'a str) -> &'a str{
24
        if a == "hello" {a} else {b}
25
    }
26
27
    fn func(s: &mut String){
28
        s.push_str("y");
29
        println!("{} {}",s,s);
30
31
   }
```

Ownership

If there is no owner, write "NONE".

True

False

wno is the owner of "m	ut" immediately after line 5 is ru	n? _
Who is the owner of "he	ey" immediately after line 24 is ru	ın? 🗆

Who is the owner of "bye" immediately after line 12 is run? $\hfill\Box$

Who is the owner of "ay" immediately after line 29 is run? \Box

Who is the owner of "a" immediately after line 18 is run?

Lifetimes

At what line is the value of "mut" dropped?	
At what line is the value of "hey" dropped?	

At what line is the value of "bye" dropped? \qed



Version 2:

```
fn main(){
        let f;
2
 3
                                                                                  Ownership
             let x = String::from("mut");
 4
                                                                           If there is no owner, write "NONE".
             f = &x;
 5
        }
 6
 7
        let c;
8
9
10
             let y = String::from("hey");
             let z = "bye";
11
             let d = z;
12
             c = greethuh(y.as_str(),d);
13
14
        }
15
16
         let mut s = String::from("a");
17
         let s1 = &mut s;
18
         func(&mut s);
19
         println!("{}",s);
20
21
    }
22
23
    fn greethuh < 'a > (a:&'a str, b:&'a str) -> &'a str{
24
        if a == "hello" {a} else {b}
25
   }
26
27
    fn func(s: &mut String){
28
29
        s.push_str("y");
        println!("{} {}",s,s);
30
31 }
```

Who is the owner of "a" immediately after line 18 is run?
Who is the owner of "mut" immediately after line 5 is run?
Who is the owner of "hey" immediately after line 24 is run?
Who is the owner of "bye" immediately after line 12 is run?
·
Who is the owner of "a" immediately after line 29 is run?
At what line is the value of "hey" dropped?
At what line is the value of "bye" dropped?
At what line is the value of "mut" dropped?



Version 3:

```
fn main(){
 1
        let f;
 2
 3
        {
             let x = String::from("mut");
 4
 5
             f = x;
        }
 6
 7
        let c;
8
9
10
             let y = String::from("hey");
             let z = "bye";
11
             let d = y;
12
            c = greethuh(z,d.as_str());
13
14
        }
15
16
         let mut s = String::from("a");
17
         let s1 = &s;
18
         func(&mut s);
19
         println!("{}",s);
20
21
    }
22
23
    fn greethuh < 'a > (a:&'a str, b:&'a str) -> &'a str{
24
        if a == "hello" {a} else {b}
25
    }
26
27
   fn func(s: &mut String){
28
        s.push_str("y");
29
        println!("{} {}",s,s);
30
31 }
```

Ownership

If there is no owner, write "NONE".

,	
Who is the owner of "ay" immediately after line 29 is	run?
Who is the owner of "mut" immediately after line 5 is	run? 🖂
Who is the owner of "bye" immediately after line 24 is	s run?
Who is the owner of "a" immediately after line 18 is	run?
Who is the owner of "hey" immediately after line 12 is	s run?
Lifetimes	
At what line is the value of "bye" dropped?	
At what line is the value of "hey" dropped?	
At what line is the value of "mut" dropped?	



Version 4:

```
fn main(){
 1
                                                                                          Ownership
         let f;
 2
                                                                                 If there is no owner, write "NONE".
 3
              let x = String::from("mut");
 4
              f = x;
 5
                                                                 Who is the owner of "hey" immediately after line 24 is run?
         }
 6
 7
8
         let c;
                                                                  Who is the owner of "mut" immediately after line 5 is run?
 9
              let y = String::from("hey");
10
              let z = "bye";
11
                                                                  Who is the owner of "ay" immediately after line 29 is run?
              let d = z;
12
              c = greethuh(d, y.as_str());
13
         }
14
                                                                  Who is the owner of "a" immediately after line 18 is run?
15
16
          let mut s = String::from("a");
17
                                                                 Who is the owner of "bye" immediately after line 12 is run?
          let mut s1 = s;
18
19
          func(&mut s1);
                                                                                           Lifetimes
          println!("{}",s1);
20
21
    }
22
                                                                       At what line is the value of "bye" dropped?
23
    fn greethuh <'a>(a:&'a str, b:&'a str) -> &'a str{
24
25
         if a == "hello" {a} else {b}
                                                                       At what line is the value of "mut" dropped?
    }
26
27
    fn func(s: &mut String){
28
                                                                       At what line is the value of "hey" dropped?
         s.push_str("y");
29
         println!("{} {}",s,s);
30
   }
31
```