



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

True False

Problem 2: Lifetimes and Borrowing

[16 pts]

Version 1:

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

Ownership

If there is no owner, write "NONE".

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 "ay" immediately after line 29 is run? ☐

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? ☐



Version 2:

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

Ownership

If there is no owner, write "NONE".

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:

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

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

Who is the owner of "hey" immediately after line 12 is 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:

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

Ownership

If there is no owner, write "NONE".

Who is the owner of "hey" immediately after line 24 is run?

Who is the owner of "mut" immediately after line 5 is run?

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

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

Who is the owner of "bye" immediately after line 12 is run?

Lifetimes

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

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

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