

CS132 Software Engineering: Homework 3

Due 11:59pm May 4th, 2023

Code of Conduct

This homework should be your own individual work. Discussion on concept, methodology, and class materials are welcomed, but copying is strictly prohibited. Plagiarism, once confirmed, may result in assignment grades reduced to zero for all involved people. And this event will be reported. You are encouraged to use \LaTeX to produce your answers based on this template. Other forms of submission will also be accepted.

1. (0.5 + 1 + 1 + 0.5 + 0.5 = 3.5 pts) Control Flow Testing

(a) For the following algorithm:

```
1 fn some_wacky_algorithm(mut y: i32) -> i32 {
2     let (mut s, mut x) = (0, 0);
3     while x < y {
4         x += 3;
5         y += 2;
6         if x + y < 10 {
7             s += x + y;
8         } else {
9             s += x - y;
10        }
11        s += 1;
12    }
13    if s > 0 {
14        return s;
15    } else {
16        return -1;
17    }
18 }
```

i. (0.5 pts) Draw the Control Flow diagram for this function.

Note: Use line number to represent state. All braces are can be ignored.

ii. (1 pts) Identify a set of linearly independent paths from the control flow.

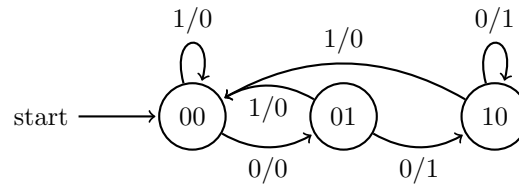
Hint: A linearly independent path is any path through the application that introduces at least one new edge that is not included in any other linearly independent path.

iii. (1 pts) Identify complete test cases (input, output) corresponding to the linearly independent paths.

(b) For the following code segment:

```
1 fn another_wacky_function(a: i32, b: i32, mut x: i32) {
2     if a < 3 && b >= 1 {
3         x /= a;
4         return;
5     }
6     if a >= 4 || x == 7 {
7         x -= 2;
8         return;
9     }
10    if b < 2 && x <= 4 {
11        x = a;
12        return;
13    }
14 }
```

- i. (0.5 **pts**) What is the minimum number of test cases needed for a complete coverage in branch (decision) testing? Provide a set of such test cases and justify.
- ii. (0.5 **pts**) What is the minimum number of test cases needed for a complete coverage in condition testing? Provide a set of such test cases and justify.
2. (0.5 + 1 = 1.5 **pts**) State Transition Coverage Testing
For a State Machine shown below:



Note: The x/y on each transition refers to input/output of the transition. Also each test case should contain: start state, input, expected output, finish state and test coverage item

- (a) (0.5 **pts**) Draw the State Table for the state machine.

State\Input		

- (b) (1 **pts**) Identify 0-switch test cases for the state machine.

Test case						
Start state						
Input						
Final state						
Expected output						
Test coverage item						