

Objectives - Fri 2/21/2020

- Goal: Code correctness
 - ... and ways to achieve it
- Code coverage
 - line
 - branch
 - path
- Memory faults
- Valgrind messages
 - How to read the memory leak message

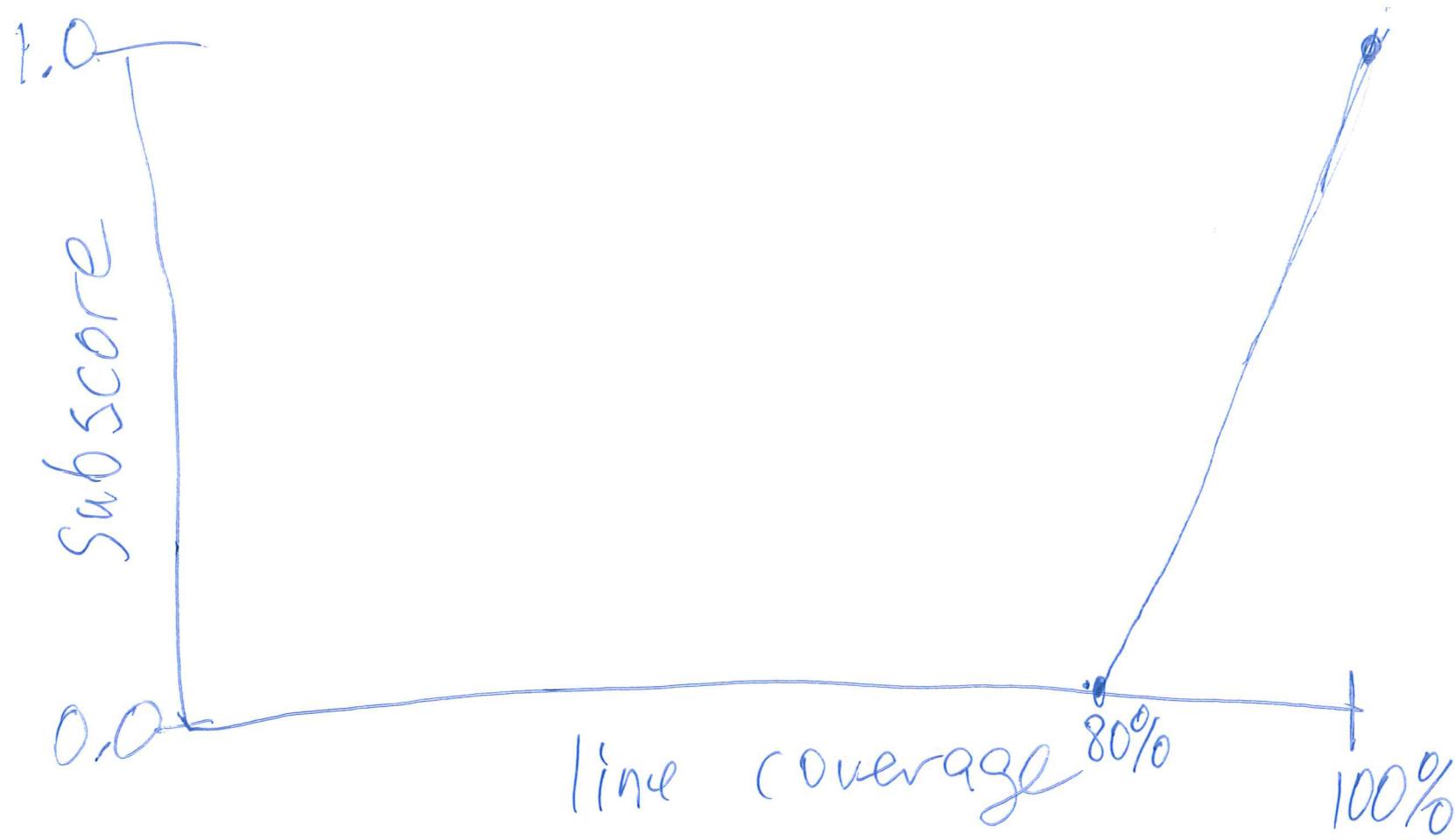
Goal: Correctness

Ways to achieve:

0. Don't write buggy code.
1. Correctness by construction
2. Validation
3. Testing
 - └ Unit testing
 - ... (and others)

Testing can
show bugs
but not absence
of bugs

Scores on your tests



Types of test code coverage

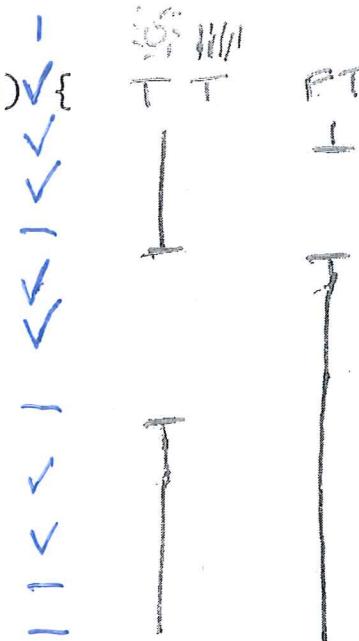
- “Line coverage” means every line of the code being tested was executed at least once.
- “Branch coverage” means for every conditional jump (If/While/For/Switch), we took the jump (condition true) and did not take the jump (condition false) at least once.
- “Path coverage” means we tested every possible path through the code (unique combination of branches). *This can be hard.*

not checked in ECE 264

line coverage \subseteq branch coverage \subseteq path coverage

////// IMPLEMENTATION CODE ////

```
void report_weather(bool is_sunny, bool is_raining){  
    Branch 1  
    if(is_sunny) {  
        printf("The sun is shining.\n");  
    }  
    else {  
        printf("The sun is not shining.\n");  
    }  
  
    Branch 2  
    if(is_raining) {  
        printf("It is raining.\n");  
    }  
}
```



Branch	T	F
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>

//////////// TEST CODE //////////

```
void test_report_weather_1() { // LINE coverage  
    report_weather(true, true); // The sun is shining. It is raining.  
    report_weather(false, true); // The sun is not shining. It is raining.  
}
```

```
void test_report_weather_2() { // BRANCH coverage
```

```
    report_weather(true, true); // The sun is shining. It is raining.  
    report_weather(false, false); // The sun is not shining.
```

```
}  
Branch 1      Branch 2
```

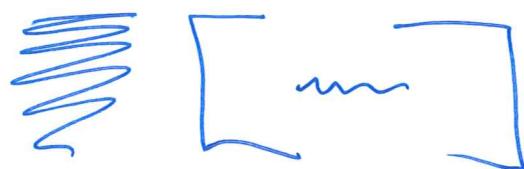
```
void test_report_weather_3() { // PATH coverage
```

```
    report_weather(true, true); // The sun is shining. It is raining.  
    report_weather(true, false); // The sun is shining. It is raining.  
    report_weather(false, true); // The sun is not shining. It is raining.  
    report_weather(false, false); // The sun is not shining.
```

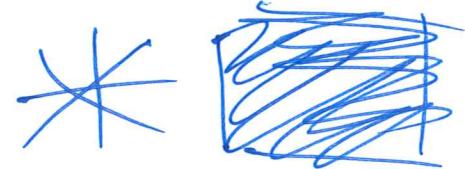
Seg faults

GDB until crash

Look for:



or



where is NULL.