

# **Software Testing, Quality Assurance & Maintenance—Lecture 3**

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# Plan

More examples on faults, errors and failures:

- numZero example (again);
- assignment 1-like exercise for `findLast`;
- testing line intersection algorithm

```
public static numZero(int[] x) {  
    int count = 0;  
    for (int i = 1; i < x.length; i++) {  
        if (x[i] == 0) count++;  
    }  
    return count;  
}
```

```
static public int findLast(int[] x, int y) {  
    for (int i = x.length - 1; i > 0 ; i--) {  
        if (x[i] == y) {  
            return i;  
        }  
    }  
    return -1;  
}
```

@Test

```
public void testFindLast() {  
    int[] x = new int[] {2, 3, 5};  
    assertEquals(0, FindLast.findLast(x, 2));  
}
```

## Exercise: Faults

Read the faulty program `findLast`, which includes a test case exhibiting a failure.

Answer the following questions:

- Ⓐ Identify the fault, and fix it.
- Ⓑ If possible, identify a test case that does not execute the fault.
- Ⓒ If possible, identify a test case that executes the fault, but does not result in an error state.
- Ⓓ If possible, identify a test case that results in an error, but not a failure. (Hint: PC)
- Ⓔ For the given test case, identify the first error state. Be sure to describe the complete state.

```
class LineSegment:
    def __init__(self, x1, x2):
        self.x1 = x1; self.x2 = x2;

    def intersect(a, b):
        return (a.x1 < b.x2) & (a.x2 > b.x1);
```