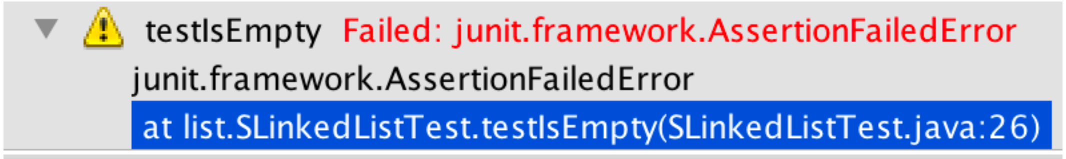
CS II: Data Structures
Lab 3: Testing and fixing a linked list

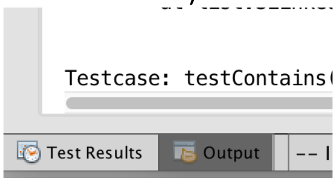
In the prelab, you ran the `SLinkedList.java` through some tests and saw that it was failing most of them. In this lab, you will fix the bugs--one by one.

1. `testIsEmpty` fails and provides a line number for the assertion that failed. You can find that line number from JUnit's output.



```
testIsEmpty  Failed: junit.framework.AssertionFailedError
  junit.framework.AssertionFailedError
  at list.SLinkedListTest.testIsEmpty(SLinkedListTest.java:26)
```

(If you can't see the test results you might need to click the Test Results button at the bottom of the console)



```
Testcase: testContains(
```

We know from looking at the test code that `l.isEmpty` incorrectly returns true when the list is not empty. Finish the `SLinkedList.isEmpty` method so that `testIsEmpty` passes.

2. `testGet` is failing on its first assertion statement. There is a bug in the `SLinkedList.get` method that makes it return data from the wrong `ListNode`. Fix it so that `testGet` passes.[1]

3. Finally, you are going to implement the `contains` method. This method returns true only if the given element is found in the list. Once you get `testContains` to pass, that is decent evidence your implementation is correct.

   If you are not sure how to start, you can try steps in this order.

   a. Draw an abstract list (i.e., [200,300]) and follow the operations in `testContains` to make sure you could explain to someone what `contains` is expected to do.
   b. Write an algorithm for `contains` in words.
   c. Show the steps of the algorithm using boxes-and-arrows.
   d. Write Java code for `contains` so it only works on lists of length 0 and 1.
   e. Write your first try at a runnable solution. Debug, debug, debug![1]

1. Debugging strategies
   - Add print statements to see what the values of the variables are at different times.
   - Draw a boxes-and-arrows diagram using the failing test case as your example input.