Choosing Test Cases

Let’s talk about what to test.

In Lab2 you create a class MyArrayList<E> with methods

a) 2 constructors
b) int size()
c) boolean add(E item) void add(int index, e item)
d) E get()
e) E set(int index, E item
f) E remove(int index)
g) boolean isEmpty( )
h) void clear( )

There are 3 ways a method can go wrong:

A. its basic functionality could be wrong,
B. it might fail at the extremes (What if the list has 0 or 1 entry? What if it is full?)
C. it could fail by interacting badly with another method.

To test our code we want to write test cases that cover these possibilities as thoroughly as possible.

Suppose we are testing boolean add(E item) Here are some things to test:

A. Basic functionality: If we add some data to the end of the list, can we call get( ) to retrieve it? Can we do a sequence of adds? Does add always return true?
B. Extreme cases: Can we add to the empty list? If you start an ArrayList with an array of capacity 2, what happens if you add 3 elements to it?
C. Interactions with other methods: Is the size correct after an add? Can you add to the end of a list after removing the last element of the list?

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Many of these test cases are covered by the following method:

```
void testAddE( ) {
        myArrayList<Integer > L = new myArrayList<Integer>(2);
        Boolean returnVal = true;
        for (int i = 0;  i < 5; i++) {
                returnVal = returnVal && L.add(i*i);
                AssertEquals(L.size(), i+1 );
        }
        AssertTrue(returnVal);
        for (int i = 0; i < 5; i++) {
                int j = L.get(i);
                AssertEquals( j, i*i);
        }
}
```

Now suppose we are testing the two-argument add: void add(int index, E item). Here are issues to test:

A. Basic functionality: If we add some data, can we retrieve it with get()? Can we do a sequence of adds?
B. Extreme cases: Can we add to the empty list? If size == N, can we add at index 0, and index N?
C. Do we throw the right exceptions if the index is too small or too big?
D. D) Interactions with other methods: Is the size correct after an add? Can you remove an element from a list and then add a new element at the same location?

In addition to the tests for the 1-argument add, you might have this in testing the 2-argument add:

```
MyArrayList<Integer> L = new MyArray List<Integer>();
int [] A = {5, 10, 25};
for (int x: A)
        L.add(x);
L.add(3, 500);
L.add(0, 100);
AssertEquals( L.get(0), 100);
AssertEquals( L.get(1), 5);
AssertEquals( L.get(2), 10);
AssertEquals( L.get(3), 25);
AssertEquals( L.get(4), 500);
```