

1 Arrays

- 1.1 Define functions `squareSum` and `squareSumRecursive` that square every element in an `int[]` `values` and returns the sum of all the squared values.

```
public class FunWithArrays {
    public static int squareSum(int[] values) {
        int sum = 0;
        for (int i = 0; i < values.length; i++) {
            values[i] *= values[i];
            sum += values[i];
        }
        return sum;
    }

    public static int squareSumRecursive(int[] values, int index) {
        values[index] *= values[index];
        if (index == values.length - 1) {
            return values[index];
        }
        return values[index] + squareSumRecursive(values, index + 1);
    }
}
```

- 1.2 Provide a descriptive name for each of the following methods. Assume that `values` contains at least one element.

```
private static boolean _____ (int[] values) {
    int k = 0;
    while (k < values.length-1) {
        if (values[k] > values[k+1]) {
            return false;
        }
        k = k+1;
    }
    return true;
}
```

`isIncreasing`

```
private static void _____ (int[] values) {
    int k = 0;
    while (k < values.length/2) {
        int temp = values[k];
        values[k] = values[values.length-1-k];
    }
}
```

2 Arrays, Recursion, & Pointers

```
        values[values.length-1-k] = temp;  
        k = k+1;  
    }  
}
```

reverse

2 Debugging

- 2.1 This program was supposed to sum up all the elements in the array, but you get this error when you tried to run it:

```
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: 55
    at Sum.sum(Test.java:15)
    at Sum.main(Test.java:28)
```

where line 15 of Sum is:

```
total += nums[i];
```

What do you think went wrong?

i was incremented beyond the length of the array (i >= nums.length).

- 2.2 You get this error when you tried to run someone's code to traverse an SLList.

```
Exception in thread "main" java.lang.NullPointerException
    at IntNode.traverse(IntNode.java:25)
    at IntNode.main(IntNode.java:63)
```

where line 25 of IntNode is:

```
nextNode = currNode.next;
```

What do you think the programmer forgot to add?

Forgot to add a null check: currNode might be null.

- 2.3 You receive this compiler error:

```
Test.java:67: error: non-static variable name cannot be referenced
from a static context
    System.out.println(name);
                        ^
```

Describe why this error occurred.

name, an instance variable (non-static), was referenced from a static method.

3 Pointers

3.1 Draw a box-and-pointer diagram for the following program.

```
public class IntList {
    int first;
    IntList rest;

    public IntList(int first, IntList rest) {
        this.first = first;
        this.rest = rest;
    }

    public static void main(String[] args) {
        IntList N = new IntList(1, null);
        IntList M = new IntList(2, N);
        N.rest = M;
        M.rest.rest.rest = new IntList(3, N);
        N = N.rest;
    }
}
```

