

Name: _____

1. Is the following statement **true** or **false**?

Adding to the end of a Java ArrayList is always a constant time, $O(1)$, operation!

Briefly explain your answer.

2. If you run the implementation of insertion sort covered in class on the array

$$[0, 1, 2, 3, \dots, n-2, n-1, n]$$

how many comparisons will be made (that is, how many times will you compare two elements of the array with ' $<$ ' operation) and how many proper swaps (that is, how many swaps that actually move elements of the array) will be performed. Express your answers using O-notation.

Insertion Sort from Class

```
public class RecursiveSelectionSort implements SortInterface {
    public void sort(int[] elementArray) {
        selectionSort(elementArray, elementArray.length - 1);
    }

    void selectionSort(int[] array, int endIndex) {
        if (endIndex > 0) {
            int largest = indexOfLargest(array, endIndex);
            swap(array, largest, endIndex);
            selectionSort(array, endIndex - 1);
        }
    }

    private int indexOfLargest(int[] array, int endIndex) {
        int largeIndex = 0;
        for (int i = 1; i <= endIndex; i++) {
            if (array[i] > array[largeIndex]) {
                largeIndex = i;
            }
        }
        return largeIndex;
    }

    private void swap(int[] array, int firstIndex, int secondIndex) {
        int temp = array[firstIndex];
        array[firstIndex] = array[secondIndex];
        array[secondIndex] = temp;
    }
}
```