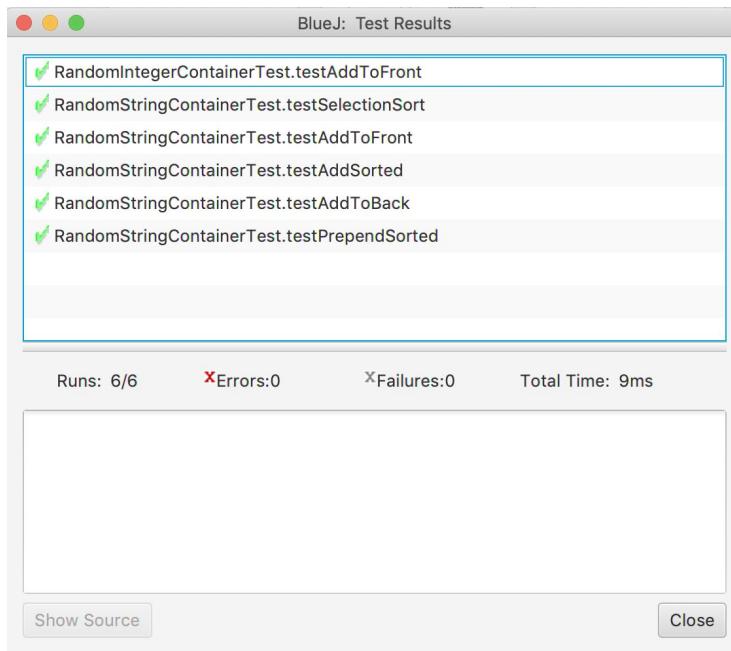


Dylan Maloy  
CS150Lab.3  
Lab #2 write-up  
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### Introduction:

The goal of Lab #2 was to create a program that would test the different properties and abilities of the ArrayList, and their time complexities. The program consisted of a “RandomIntegerContainer” class which has one method, “AddToFront”. This method would add an integer to the front of the ArrayList and return an integer array. The more complex class, “RandomStringContainer” had six methods, five of which were tested explicitly. “AddToFront” and “AddToBack” which either added a string to the front of the arrayList or added one to the back. This became useful when populating the arrayList for the other methods to use. “AddSorted” and “PrependSorted” both utilized the Binary search method “search” to find the correct index to keep the ArrayList sorted, however prependSorted would append the input string to the first element in the existing array before being placed into the correct index. Lastly, “selectionsort” would sort the array using the selection sort algorithm. This was useful for sorting the array when a method expected an already sorted array (ie. “AddSorted” and “PrependSorted”). The program was controlled through the “ExperimentController”, and it’s methods would be used to control the container methods and print their compute-times to the console.

### Unit Tests:



- BlueJ “Test Results” window after running the Unit Tests

### Output Required:

```
BlueJ: Terminal Window - lab2
Execute time (timeAddToFront): 1ms
Execute time (timeAddToback): 0ms
Execute time (timePrependSorted): 2ms
Execute time (timeAddSorted): 0ms
Execute time (timeSortofUnsortedList): 7ms
Execute time (timeSortofSortedList): 7ms
```

- Console output at 500 items

```
BlueJ: Terminal Window - lab2
Execute time (timeAddToFront): 1ms
Execute time (timeAddToback): 1ms
Execute time (timePrependSorted): 2ms
Execute time (timeAddSorted): 1ms
Execute time (timeSortofUnsortedList): 9ms
Execute time (timeSortofSortedList): 6ms
```

- Console output at 1000 items

```
BlueJ: Terminal Window - lab2
Execute time (timeAddToFront): 2ms
Execute time (timeAddToback): 1ms
Execute time (timePrependSorted): 1ms
Execute time (timeAddSorted): 1ms
Execute time (timeSortofUnsortedList): 160ms
Execute time (timeSortofSortedList): 149ms
```

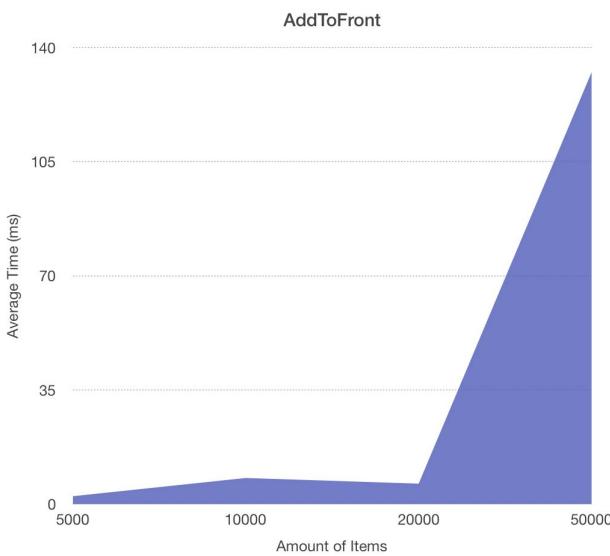
- Console output at 5000 items

```
BlueJ: Terminal Window - lab2
Execute time (timeAddToFront): 47ms
Execute time (timeAddToback): 7ms
Execute time (timePrependSorted): 2ms
Execute time (timeAddSorted): 1ms
Execute time (timeSortofUnsortedList): 3831ms
Execute time (timeSortofSortedList): 3641ms
```

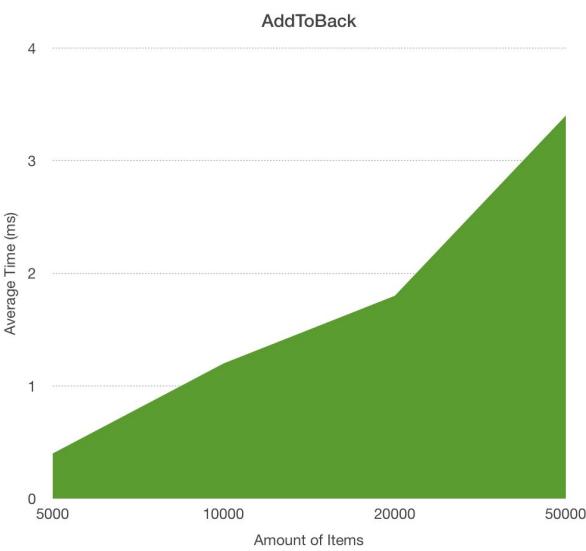
- Console output at 20000 items

```
BlueJ: Terminal Window - lab2
Execute time (timeAddToFront): 137ms
Execute time (timeAddToback): 12ms
Execute time (timePrependSorted): 4ms
Execute time (timeAddSorted): 3ms
Execute time (timeSortofUnsortedList): 15194ms
Execute time (timeSortofSortedList): 14933ms
```

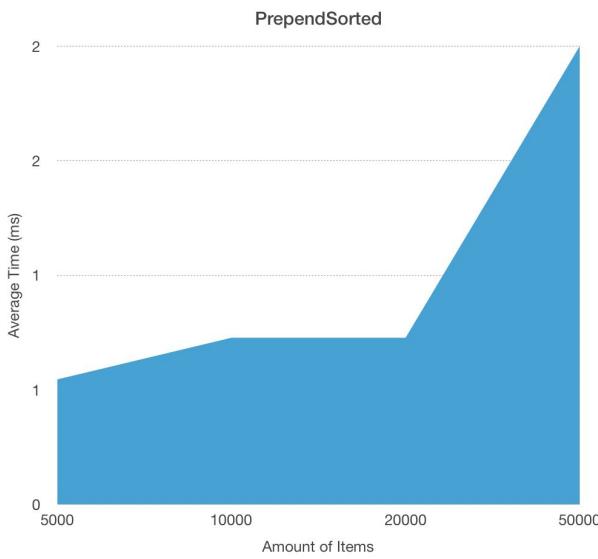
- Console output at 50000 items



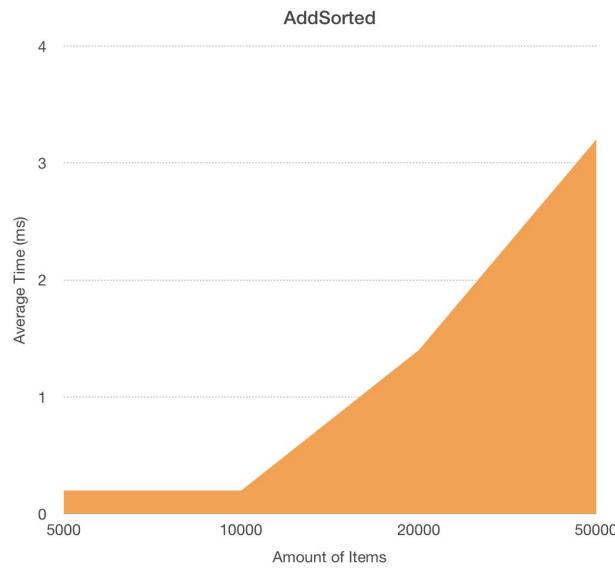
- Graph showing avg. compute time vs. amount of items for AddToFront



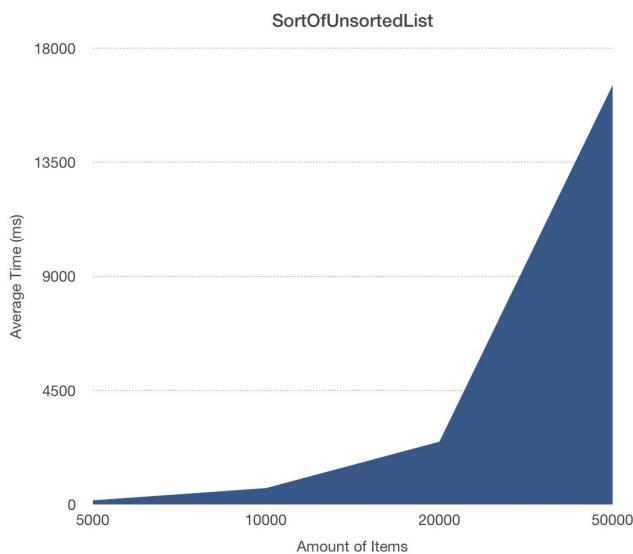
- Graph showing avg. compute time vs. amount of items for AddToBack



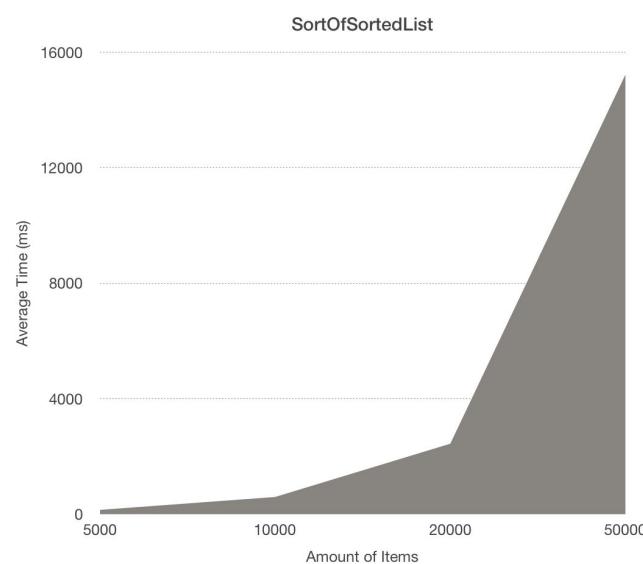
- Graph showing avg. compute time vs. amount of items for PrependSorted



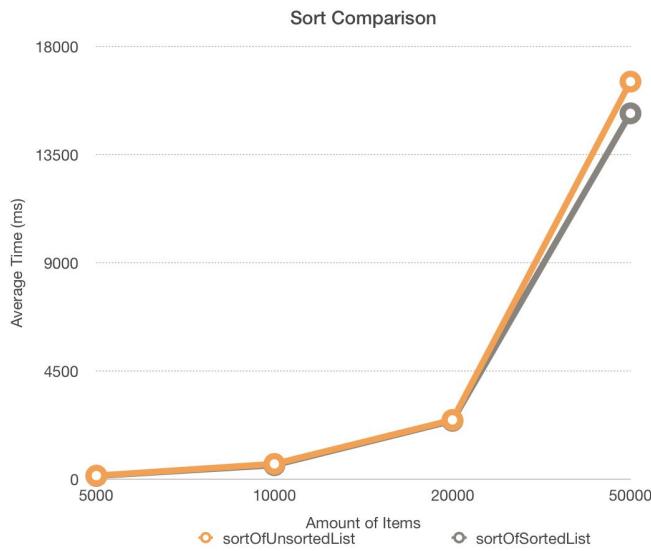
- Graph showing avg. compute time vs. amount of items for AddSorted



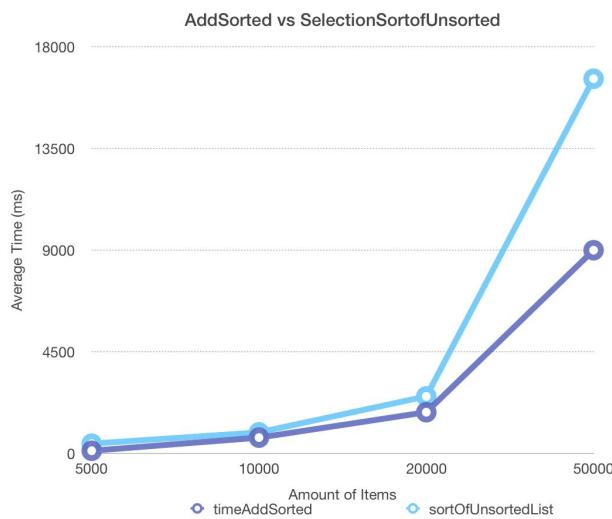
- Graph showing avg. compute time vs. amount of items for SortOfUnsortedList



- Graph showing avg. compute time vs. amount of items for SortOfSortedList



- Graph comparing the avg. results of sorting a sorted and unsorted list (seeds are consistent)



- Graph comparing the avg. results of addSorted and sortOfUnsortedList (seeds are consistent)

### Trouble Report:

This section is not applicable because all of my methods work as intended.

**References:**

1. Selection Sort  
<https://learn.zybooks.com/zybook/LAFAYETTECS150PfaffmannFall2019/chapter/4/section/2>
2. Binary Search  
<https://learn.zybooks.com/zybook/LAFAYETTECS150PfaffmannFall2019/chapter/3/section/2>