

# ArrayList Efficiency Understanding

- ☞ Efficiency/time complexities for the topic are considered. Note that these discussions are not exhaustive or representative of the types of questions that may be found on the exams.
- ☞ Practice problems are given to test your understanding of the topic. These problems are not for a grade, but promote a deeper level of understanding of the topic. Unless otherwise specified, assume you are using  $n$  data/objects/datas in the data structure or algorithm.
- ☞ We look at the worst/average/best case of Big O; however, do not expect all three cases to be explored extensively.
- ☞ Feel free to discuss these problems in recitation or during office hours at the TA Help Desk.

ArrayList time complexity is consistent over the four basic operations of add, remove, access, search. Thus, the Big O for worst and average case is considered the same.

## Access and Search

The access and search operations do not modify the ArrayList. Their purpose is to locate an data in the ArrayList.

- 1) What is the time complexity of accessing data at a known index in an arraylist? \_\_\_\_\_
- 2) What if you need to find data in a sorted arraylist and you do not know its index? \_\_\_\_\_
- 3) What if you need to find data in an unsorted arraylist and you do not know its index?  
\_\_\_\_\_

## Add

The add operation does modify the ArrayList, and in some situations make the ArrayList regrow in size.

- 1) What is the time complexity to add data at the front of an arraylist which is not at capacity?  
(Note that there is a shift for every data.)\_\_\_\_\_
- 2) What is the time complexity to add data at the back of an arraylist which is not at capacity?  
\_\_\_\_\_
- 3) What is the time complexity to add data at an arbitrary index within the arraylist which is not at capacity? \_\_\_\_\_
- 4) What is the time complexity to resize an arraylist? \_\_\_\_\_
- 5) What is the time complexity to add data at the front of a full arraylist? \_\_\_\_\_
- 6) What is the time complexity to add data at the back of a full arraylist? \_\_\_\_\_

7) What is the time complexity to add data at an arbitrary index within a full arraylist? \_\_\_\_\_

### **Remove**

The remove operation does modify the ArrayList.

1) What is the time complexity to remove data at the front of a full arraylist?\_\_\_\_\_

2) What is the time complexity to remove data at the back of a full arraylist? \_\_\_\_\_

3) What is the time complexity to remove data at an arbitrary index within a full arraylist?

\_\_\_\_\_