

COMSC 205 Worksheet 8: ArrayLists

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Here are the instance variables for our MHCArrayList class:

```
public class MHCArrayList<E> {  
    private E[] elements; // Array holding list elements  
    private int capacity; // Max number of values that fit in the array  
    private int size; // Current number of elements in the list
```

Question 1. Following a similar structure of get(), let's implement the set method for our ArrayList:

```
// Replaces the element at position in this list with the given value.  
public void set(int position, E value) {  
    // Check that the position is valid  
    if (position < 0 || position >= size) {  
        throw new IndexOutOfBoundsException(position);  
    }  
  
    // Then, replace the element at the position in the elements array.  
    // Fill in the blank below:  
  
    _____  
}
```

Question 2. ArrayList's add(E value) method adds a value to the next empty slot at the end of the ArrayList:

```
public boolean add (E value) {  
    elements[size] = value;  
    size++;  
    return true;  
}
```

2a. What is the $O()$ of add as shown here?

2b. The code shown above won't work if the elements array is full. What boolean statement could you write to check if the elements array is full? **Hint:** check the instance variables of MHCArrayList.

Question 3. Let's write `remove(int position)`, following a similar structure of `add(int position, E o)`.

3a. Suppose we have the following ArrayList named letters:

0	1	2	3	4
c	o	r	g	i

Fill in what the ArrayList should look like after we call `letters.remove(1)` on it:

0	1	2	3	4

3b. Now, let's think about how we might write this as a loop. Fill in this table of the old and new indices of the letters before and after the call `letters.remove(1)`. Note that the first column is the index **after** remove.

	Index after remove	Index before remove
c	0	0
r	1	
g		
i		

Here is the method signature of our remove method:

```
// Removes the element at the specified position in this list, and returns it.  
public E remove(int position);
```

3c. What index do we need to **start at** to update the indices for our letters ArrayList? Which variable does this correspond to?

3d. For the letters that we have to move inside of our internal elements array, what is the code that we need to write inside of our for loop to move them into the right spot? We're updating the index at position `i`, so we need to know what element position should **be assigned** to index `i`.

```
// Replace the element at i
```

```
elements[i] = _____;
```