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CS 421

Question #2

```java
import java.util.ArrayList;
import java.util.Arrays;

public class Main {

    public static ArrayList<Integer> ARRAY = new ArrayList<Integer>(Arrays.asList(20, 13, 15, 43, 7, 27, 2, 33));

    public static void main(String[] args) {
        ArrayList<Integer> fin = merge_sort(ARRAY);
        //System.out.print(fin);                          Commented out to not double print :)
    }

    public static ArrayList<Integer> merge_sort(ArrayList<Integer> array) {

        int array_size = array.size();
        int array_size_2 = array.size()/2;
        ArrayList<Integer> Larray = new ArrayList<Integer>();
        ArrayList<Integer> Rarray = new ArrayList<Integer>();

        if(array_size == 1) {
            return array;
        }

        for(int i = 0; i < array_size_2; i++) {
            Larray.add(array.get(i));
            Rarray.add(array.get(i + array_size_2));
        }
        System.out.println(Larray);
        System.out.println(Rarray);
```

```java
        ArrayList<Integer> L = merge_sort(Larray); //l1 r1
        ArrayList<Integer> R = merge_sort(Rarray); //l2 r2

        return merge(L, R);
    }

public static ArrayList<Integer> merge(ArrayList<Integer> left, ArrayList<Integer> right) {

        ArrayList<Integer> ret = new ArrayList<Integer>();

        while(!left.isEmpty() && !right.isEmpty()) {
                if (left.get(0) > right.get(0)) {
                        ret.add(right.get(0));
                        right.remove(0);
                }
                else {
                        ret.add(left.get(0));
                        left.remove(0);
                }
        }

        while(!left.isEmpty()) {
                ret.add(left.get(0));
                left.remove(0);
        }

        while(!right.isEmpty()) {
                ret.add(right.get(0));
                right.remove(0);
        }
        System.out.println(ret);
        return ret;
    }
```

}

b) Output: [2, 7, 13, 15, 20, 27, 33, 43]

c)