

Antonius Jose Arviano Sundoro
2702357932

1.

- a) $O(n^2)$ because both of the loop runs in N times
- b) $O(n)$ because the second loop runs in 2 times regardless of the value of n
- c) $O(n^2)$ because both of the loop runs in N times just in a different format. Like how the second loop instead of incrementing it decrements
- d) $O(n^2)$ because i is also dependant on N

2.

[0, 1, 2, 3, 3, 3, 3, 7]

[0, 1, 2, 3, 3, 4, 5, 6]

3.

- a) $O(1) + O(n) + O(1) = O(n)$
- b) $O(r1*c2*c1) + O(1) = O(r1*c2*c1)$
- c) $O(1) + O(n) + O(n) + O(n) = O(n)$
- d) $O(1) + O(\log n) = O(\log n)$

4. Insertion sort has the time complexity of $O(n^2)$ for both worst case and average. But $O(n)$ for best case. Merge sort has time complexity of $O(n \log(n))$. Binary search has $O(\log n)$. Factorial time complexity has $O(n!)$. Exponential time complexity has $O(2^n)$. Accessing an element in an array by index $O(1)$.

5. ADT is a type (or class) for objects whose behavior is defined by a set of values and a set of operations. An example of ADT in java is when we use ListADT.

6.

	List	ArrayList
1	List is an interface	ArrayList is a class
2	The size of a List depend on the implementing class	Arraylist is a dynamic and can grow or shrink as needed

7.

```
ArrayList<Integer> Number = new ArrayList<>();  
Number.add(12);  
Number.add(25);  
Number.add(34);  
Number.add(46);  
Number.remove(1);  
System.out.println(Number);
```