Q1) Implement a program that can perform Binary Search on an integer array. Given an array the program should be able to find the index of a given element. **The Binary Search Algorithm must be implemented recursively.**

The program's output should look similar to the below

Ex)

Standard Output: *Given Array: 2 3 4 10 40*
Standard Output: *Searching for: 10*
Standard Output: *Element found at index 3*

Q2) Implement a program that can perform Merge Sort on an integer array. **The Merge Sort Algorithm must be implemented recursively.**

The programs output should look similar to the below

Ex)

Standard Output: *Given Array: 12 11 13 5 6 7*

Standard Output: *Sorted array: 5 6 7 11 12 13*

Q3) Implement a program that uses an Integer Array List. The program will prompt the user for how long the Array List is. The user will then fill up the Array List with integers. Then have the program call a sort method on the Array List to order the list from smallest to largest.

Hint

/ Sorting of arraylist using Collections.sort*/*
Collections.sort(arraylist);

The programs output should look similar to the below

Ex)

Standard Output: *How long is the list?*
Standard Input: *4*

Standard Output: *Enter the 1th element in the list*
Standard Input: *5*

Standard Output: *Enter the 2th element in the list*
Standard Input: *2*

Standard Output: *Enter the 3th element in the list*
Standard Input: *7*

Standard Output: *Enter the 4th element in the list*
Standard Input: *1*

Standard Output: *Before Sorting: [5, 2, 7, 1]*
Standard Output: *After Sorting:[1, 2, 5, 7]*