HW-6

Question – 1:

(*Execution time for sorting*) Write a program that obtains the execution time of selection sort, bubble sort, merge sort, quick sort, heap sort, and radix sort for input size 50,000, 100,000, 150,000, 200,000, 250,000, and 300,000. Your program should create data randomly and print a table like this:

Array size	Selection Sort	Bubble Sort	Merge Sort	Quick Sort	Heap Sort	Radix Sort
50,000						
100,000						
150,000						
200,000						
250,000						
300,000						

Question -2:

(*Generic merge sort*) Write the following two generic methods using merge sort. The first method sorts the elements using the `Comparable` interface and the second uses the `Comparator` interface.

```
public static <E extends Comparable<E>>
  void mergeSort(E[] list)
public static <E> void mergeSort(E[] list,
  Comparator<? super E> comparator)
```

Question-3:

(*Improve quick sort*) The quick sort algorithm presented in the book selects the first element in the list as the pivot. Revise it by selecting the median among the first, middle, and last elements in the list.

Question-4:

(*Min-heap*) The heap presented in the text is also known as a *max-heap*, in which each node is greater than or equal to any of its children. A *min-heap* is a heap in which each node is less than or equal to any of its children. Min-heaps are often used to implement priority queues. Revise the **Heap** class in Listing 23.9 to implement a min-heap.