CS 61B Summer 2020

Small Group Tutoring
Section 12: Sorting

Worksheet 12

1 Step by Step Sorts

Show the steps taken by each sort on the following unordered list of integers (duplicate items are denoted with letters):

```
2, 1, 8, 4A, 6, 7, 9, 4B
```

1. Insertion Sort

2. Selection Sort

3. Merge Sort

4. Heapsort *Note: if both children are equal, sink to the left.*

2 Sorting Runtimes

Fill out the best-case and worst-case runtimes for these sorts as well as whether they are stable or not in the table below.

	Best-Case Runtime	Worst-Case Runtime	Stability
Selection Sort			
Insertion Sort			
Heapsort			
Mergesort			
Quicksort			
Counting Sort			
LSD Radix Sort			
MSD Radix Sort			

3 You Choose

1. We have a system running insertion sort and we find that it's completing faster than expected. What could we conclude about the input to the sorting algorithm?

2. Give a 5 element array such that it elicits the worst case runtime for insertion sort.

3. Give some reasons why someone would use merge sort over quicksort.

4. Which sorts never compare the same two elements twice?

5. When might you decide to use radix sort over a comparison sort, and vice versa?

4 Name That Sort

Below you will find some intermediate steps in performing various sorting algorithms on the same input list. The steps do not necessarily represent consecutive steps in the algorithm, but they are in the correct sequence. Identify the algorithm for each problem:
Input list: 1429, 3291, 7683, 1337, 192, 594, 4242, 9001, 4392, 129, 1000

1.
```
1429, 3291, 7683, 192, 1337, 594, 4242, 9001, 4392, 129, 1000
1429, 3291, 192, 1337, 7683, 594, 4242, 9001, 129, 1000, 4392
192, 1337, 1429, 3291, 7683, 129, 594, 1000, 4242, 4392, 9001
```

2.
```
1337, 192, 594, 129, 1000, 1429, 3291, 7683, 4242, 9001, 4392
192, 594, 129, 1000, 1337, 1429, 3291, 7683, 4242, 9001, 4392
129, 192, 594, 1000, 1337, 1429, 3291, 4242, 9001, 4392, 7683
```

3.
```
1337, 1429, 3291, 7683, 192, 594, 4242, 9001, 4392, 129, 1000
192, 1337, 1429, 3291, 7683, 594, 4242, 9001, 4392, 129, 1000
192, 594, 1337, 1429, 3291, 7683, 4242, 9001, 4392, 129, 1000
```

4.
```
1429, 3291, 7683, 9001, 1000, 594, 4242, 1337, 4392, 129, 192
7683, 4392, 4242, 3291, 1000, 594, 192, 1337, 1429, 129, 9001
129, 4392, 4242, 3291, 1000, 594, 192, 1337, 1429, 7683, 9001
```

5.
```
12, 32, 14, 11, 17, 38, 23, 34
12, 14, 11, 17, 23, 32, 38, 34
```