Homework 8: Merge Sort and Quicksort

Instructor: Mehmet Emre

CS 32 Spring '22

Due: 05/04 12:30pm
Name & Perm # (no partners allowed):

Reading: DS 13.2

1

Circle the big-O *worst-case* running time for sorting an array of n elements using

- (3 pts) Merge sort: $O(1)$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n^2)$ $O(n^2 \log n)$

- (3 pts) Quicksort: $O(1)$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n^2)$ $O(n^2 \log n)$

2

Circle the big-O *average-case* running time for sorting an array of n elements using

- (3 pts) Merge sort: $O(1)$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n^2)$ $O(n^2 \log n)$

- (3 pts) Quicksort: $O(1)$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n^2)$ $O(n^2 \log n)$

3

Both merge sort and quicksort are divide-and-conquer algorithms.

- (4 pts) What is the main idea behind divide-and-conquer?

- (4 pts) Describe briefly how divide-and-conquer applies to merge sort.

- (4 pts) Describe briefly how divide-and-conquer applies to quicksort.

- (6 pts) Quicksort and merge sort are similar in that both are built on divide-and-conquer. Briefly highlight the *differences* between merge sort and quicksort.

- (6 pts) Briefly describe the role of the pivot element in quicksort.