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Missouri University of Science & Technology	Department of Computer Science
Spring 2024	**CS 2500: Algorithms (Sec: 102)**
Homework 2b: Quick and Heap Sort	
Instructor: *Sid Nadendla*	**Due:** *February 28, 2024*

Problem 1   Partition Subroutine   *1 point*

Probleem 5.2 (Ref. Page 117 in the textbook)

Statement:

Recall thee `Partition` subroutine employed by Quicksort. You are told that the following array has just been partitioned around some pivot element:

A = { 3, 1, 2, 4, 5, 8, 7, 6, 9 }.

Which of the elements could have been the pivot element? (List all that apply; there could be more than one possibility.)

Problem 2   Quick Sort   *2 points*

Problem 5.8 - Part 1 (Ref. Page 118 in the textbook)

Statement:

Implement the `QuickSort` algorithm in Python, and evaluate its empirical performance when the pivot is always the <u>first element</u> in the array.

One approach is to keep track of the number of comparisons between input array elements made by `QuickSort`. For several different input arrays, determine and plot the number of comparisons as the input array grows in size.

Problem 3   Heap Sort   *2 points*

Convert any input array A into a min-heap in Python. Then, sort the entries in A by implementing the `HeapSort` algorithm in Python, and evaluate its empirical performance for different input sizes.