

CSPB 3104 - Park - Algorithms

[Dashboard](#) / [My courses](#) / [2241:CSPB 3104](#) / [5 February - 11 February](#) / [Quiz 4](#)

Started on Saturday, 10 February 2024, 7:09 PM

State Finished

Completed on Saturday, 10 February 2024, 7:10 PM

Time taken 1 min 19 secs

Marks 6.00/6.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 2.00 out of 2.00

Suppose the partition algorithm is used to partition the array

[3,1,8,4, 2,9,10,6]

using the pivot element 6 (i.e, the last element of the array), which of the following arrays can result?

- ☐ [3,1,2,10,6,8,9,4]
- ☐ [1,3,2,6,6,4,9,8,10]
- ☐ [1,2,3,4,6,8,9,10]
- ☒ [3,1,4,2,6,9,10,8] ✓ Correct
- ☐ [6,3,1,2,4,8,9,10]

Mark 1.00 out of 1.00

The correct answer is: [3,1,4,2,6,9,10,8]

Write down one possible choice of the pivot element that will result in a roughly equal split of the array into two parts?

4 ✓

Note that as a result of partition, no new elements can be added or existing elements removed from the array. Furthermore, the pivot 6 must now be placed in a position where elements less than or equal are to its left and elements greater to its right.

Correct

Marks for this submission: 2.00/2.00.

Question 2

Correct

Mark 3.00 out of 3.00

Consider the following array of 9 elements to be sorted using **quicksort**:

[3, 1, 4, 6, 2, 5, 9, 7, 8]

- Quicksort chooses the pivot element uniformly at random from the list.
- The base case includes a call to a simple insertionSort routine whenever $\text{len}(\text{lst}) \leq 4$

What is the probability that the chosen pivot results in the two parts having sizes ≤ 4 ? Enter answer correct to two decimal points.

0.11



What is the probability that after the partitioning, the resulting recursive calls are over sublists of sizes 2 and 6, respectively? Enter answer correct to two decimal points.

0.22



What is the probability that the successive pivots chosen are respectively 1,2,3,4,5?

 $6.6 * 10^{(-5)}$

Correct

 $3 * 10^{(-5)}$  $2 * 10^{(-4)}$  $10^{(-2)}$  $10^{(-1)}$

Mark 1.00 out of 1.00

The correct answer is: $6.6 * 10^{(-5)}$

Correct

Marks for this submission: 3.00/3.00.

Question 3

Correct

Mark 1.00 out of 1.00

Suppose quicksort with randomized pivoting were to be repeatedly run a large number of times on the same list of size n , where n is a large number. If the number of steps taken to execute were to be averaged across the different runs, which of the following outcomes is the most likely?

Select one:

- ☐ a. Not much can be said about the average running time even after averaging over many trials.
- ☐ b. For each run of quicksort, we have at least half probability that the running time will be n^2 or larger.
- ☒ c. The average running time will be proportional to $n \log(n)$ ✔ Correct
- ☐ d. The average running time will be proportional to n^2

Your answer is correct.

The correct answer is: The average running time will be proportional to $n \log(n)$

Correct

Marks for this submission: 1.00/1.00.