

# Quiz 4: Advanced Sorting

**Due** Nov 3, 2022 at 4:30pm**Points** 10**Questions** 4**Available** Nov 3, 2022 at 8am - Nov 3, 2022 at 4:30pm 8 hours and 30 minutes**Time Limit** 10 Minutes

This quiz is no longer available as the course has been concluded.

## Attempt History

	Attempt	Time	Score
LATEST	<a href="#">Attempt 1</a>	10 minutes	3.8 out of 10

❗ Correct answers are no longer available.

Score for this quiz: **3.8** out of 10

Submitted Nov 3, 2022 at 8:13am

This attempt took 10 minutes.

Consider the implementation of QuickSelect below:

```
int lomuto_partition(int array[], int left, int right) {
    int p = array[left], s = left;
    for (int i = left + 1; i <= right; ++i) {
        if (array[i] < p) {
            ++s;
            swap(array[s], array[i]);
        }
    }
    swap(array[left], array[s]);
    return s;
}

int quick_select(int array[], size_t left, size_t right, size_t k) {
    size_t s = lomuto_partition(array, left, right);

    if (s == k - 1) {
        return ____ (a) ____;
    }
    if (s > k - 1) {
        return quick_select(array, left, ____ (b) ____, k);
    }
    return quick_select(array, ____ (c) ____, right, ____ (d) ____);
}
```

```
int quick_select(int array[], const size_t length, size_t k) {  
    return quick_select(array, 0, length - 1, k);  
}
```

Partial

## Question 1

2 / 4 pts

Fill in the 4 blanks in the quickselect algorithm.

a. b. c. d. **Answer 1:****Answer 2:****Answer 3:****Answer 4:**

Partial

## Question 2

1.8 / 3 pts

Show the array [4, 5, 6, 4, 0] after running **lomuto\_partition**

index 0:

index 1:

index 2:

index 3:

index 4:

---

**Answer 1:**

4

---

**Answer 2:**

0

---

**Answer 3:**

6

---

**Answer 4:**

4

---

**Answer 5:**

5

**Incorrect**

**Question 3**

**0 / 1 pts**

Suppose we are sorting an array of eight integers using **quicksort** with **lomuto\_partition** and have just finished the first call to **lomuto\_partition**. The array now looks as follows:

11 4 20 45 32 60 98 70

Which value or values could have been the pivot? Select all correct answers.

☐ 98

☐ 70

☐ 60

☒ 11

☐ 45

☒ 32

☐ 20

☐ 4

Incorrect

### Question 4

0 / 2 pts

Suppose MergeSort were to cut the array into 3 evenly sized subarrays (instead of 2) and did a 3-way merge after making the recursive calls.

Write the recurrence relation for this modified version of mergesort.

$T(n) =$

Use the Master Theorem to determine its complexity. (answer depends on correct 4a, indicate base for logarithm)

$$T(n) \in \Theta(\text{nlog3n})$$

---

**Answer 1:**

$$T(n/3) + (n/3)$$

---

**Answer 2:**

$$n \log_3 n$$

Quiz Score: **3.8** out of 10