

**CSE 221: Algorithms**  
**Worksheet 3**  
**Quicksort and Partitioning**

Name:

ID:

Question 1:

- a) Simulate the partitioning algorithm on the following array

0	1	2	3	4	5
7	9	5	1	11	3

- b) Explain how the partitioning algorithm is used in the quicksort algorithm to sort the array  
c) Write/Explain an algorithm that extracts the i-th element from an array using the partitioning algorithm.

Question 2: State and explain your answers for the following questions:

- a) What is the best case, worst case and average case time complexity of Quicksort algorithm?  
b) Is Quicksort stable?  
c) Is it in-place or out-of-place sorting

Question 3: What is the worst case scenario for Quicksort algorithm. Explain with an example how you would modify the quicksort algorithm to avoid the worst case situation.

Question 4: Compare between insertion sort, selection sort, mergesort, heapsort and quicksort in terms of stability, time complexity and space.