COSC 3304 – Algorithms Design and Analysis

Assignment 5

Due: 23:59:00pm, 02/20/2024

1. (1) Please create an array with 11 elements, which is the best case at the first iteration of QUICKSORT and then the worst case for the second iteration of QUICKSORT. The last element is used as a Pivot (25 points).

   (2) Please explain why your array is the best case and the worst case for the first and second iterations (25 points).

2. Please use the given SELECT to select the 4th smallest element from the array

   $$[6, 0, 2, 4, 7, -2, -4, 3]$$

   (50 points, please show detailed steps for full credits).

```
SELECT(A, p, r, i)
1  if p == r
2      return A[p]
3  q = PARTITION(A, p, r)
4  k = q - p + 1
5  if i == k          // the pivot value is the answer
6      return A[q]
7  elseif i < k
8      return SELECT(A, p, q - 1, i)
9  else return SELECT(A, q + 1, r, i - k)
```

```
PARTITION(A, p, r)
1  x = A[r]
2  i = p - 1
3  for j = p to r - 1
4      if A[j] ≤ x
5          i = i + 1
6          exchange A[i] with A[j]
7  exchange A[i + 1] with A[r]
8  return i + 1
```