Kenneth Geiler 431388 Homework 3 Question 1

a. start: {3,9,2,7,1,6,4,5}
   swap 1: (9,2) : {3, 2, 9, 7, 1, 6 , 4, 5}
   swap 2: (1,9) : {3, 2, 1, 7, 9, 6, 4, 5}
   swap 3: (4,7) : {3,2,1,4,9,6,7,5}
   swap 4: (5,9) : {3,2,1,4,5,6,7,9}

b. If PARTITION partitions around the largest element of an array, a swap operation is executed at every index because A[j] <= A[r] where j is the index and r is the largest integer in the array.

c. The worst case runtime is when there exists an array X such that when we chose the pivot element R (which is the largest element in the array) to be the least effective at decreasing the size of the subproblem. This is true because there is a pivot element that results in the subproblem only decreasing in size by 1 each time. Thus resulting in a quadratic runtime because the algorithm must evaluate n times on a recursive call with a time of n. N x N = n^2.