Lab Exercise 6 – Insertion Sort and Quick Sort   2020

Question 1

a) Write a program to read a set of numbers (between 10 to 20) from the keyboard and store them in an array.

b) Sort the numbers in ascending order with the Insertion sorting algorithm.

c) Calculate how many times it executes the while of the algorithm.

INSERTION-SORT(A)	cost	times
for $j \leftarrow 2$ **to** n	c_1	n
do $key \leftarrow A[j]$	c_2	$n - 1$
$\triangleright$ Insert $A[j]$ into the sorted sequence $A[1 .. j-1]$.	0	$n - 1$
$i \leftarrow j - 1$	c_4	$n - 1$
while $i > 0$ and $A[i] > key$	c_5	$\sum_{j=2}^{n} t_j$
do $A[i+1] \leftarrow A[i]$	c_6	$\sum_{j=2}^{n}(t_j - 1)$
$i \leftarrow i - 1$	c_7	$\sum_{j=2}^{n}(t_j - 1)$
$A[i+1] \leftarrow key$	c_8	$n - 1$

Question 2

a. Write a program to read a set of numbers and store them on an array.

b. Write function named as partition to divide the array into two parts according to the partition point.

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             then i = i + 1
6                 exchange A[i] wih A[j]
7     exchange A[i + 1] with A[r]
8  return i + 1
```

c. Call the function from the main program and display the array.
d. Modify the program to sort the elements of the array using quick sort algorithm.

QUICKSORT (A,*p,r*)
1 **if** p < r
2   q = **PARTITION**(A,*p,r*)
3   **QUICKSORT** (A,*p,q*-1)
4   **QUICKSORT** (A,*q+1,r*)