KIGALI INDEPENDENT UNIVERSITY (ULK)

POSTGRADUATE PROGRAM

MASTER OF SCIENCE IN INTERNET SYSTEMS

COMPUTER STRUCTURE MODULE

DATA STRUCTURE ASSIGNMENT 1

ACADEMIC YEAR: 2021-2022

MAXIMUM MARKS: 30

DATE: 20th August, 2021

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**Data Structures Assignment**

1) a program that solves the 8-puzzle problem using A\* or Greedy best first search

**Answer:**

2) Explaining the complexity of one of the two algorithms.

(Insertion Sort & Quick Sort):

**Answer:**

1. Insertion Sort is an easy-to-implement, stable sorting algorithm with time complexity of O(n²) in the average and worst case, and O(n) in the best case.

For very small n, Insertion Sort is faster than more efficient algorithms such as Quicksort or Merge Sort.

1. Overall time complexity of Quick Sort is **O(nLogn)**. In the worst case, it makes O(n2) comparisons, though this behavior is rare. The space complexity of Quick Sort is O(nLogn). It is an in-place sort (i.e. it doesn't require any extra storage)
2. Hence, Insertion Sort is an easy-to-implement, stable sorting algorithm with time complexity of **O(n²) in the average and worst case**, and O(n) in the best case. For very small n, Insertion Sort is faster than more efficient algorithms such as Quicksort or Merge Sort.