Assignment – 8

1. Given a positive integer array A of n elements. Sort this array in $\mathcal{O}(n+k)$ time where k is the maximum element in the array A such that your algorithm is –

- Stable
- Not stable

There is a graph $G = (V, E)$ where –

- Number of vertices $= n$
- Number of edges $= m$

2. Adjacency Matrix and Adjacency List

- Given an **undirected** graph $G = (V, E)$ in its adjacency-matrix representation. Obtain the corresponding adjacency-list representation.
- Given an **undirected** graph $G = (V, E)$ in its adjacency-list representation. Obtain the corresponding adjacency-matrix representation.
- Given an **directed** graph $G = (V, E)$ in its adjacency-matrix representation. Obtain the corresponding adjacency-list representation.
- Given an **directed** graph $G = (V, E)$ in its adjacency-list representation. Obtain the corresponding adjacency-matrix representation.

3. Connectivity

- Given an **undirected** graph $G = (V, E)$ in its adjacency-list representation. Check whether this graph is connected or not?
- Given an **undirected** graph $G = (V, E)$ in its adjacency-matrix representation. Check whether this graph is connected or not?
- Given an **directed** graph $G = (V, E)$ in its adjacency-list representation. Check whether this graph is strongly connected or not?
  - Time complexity $= \mathcal{O}(n(m+n))$
  - Time complexity $= \mathcal{O}(m+n)$
- Given an **directed** graph $G = (V, E)$ in its adjacency-matrix representation. Check whether this graph is strongly connected or not?
  - Time complexity $= \mathcal{O}(n(m+n))$
  - Time complexity $= \mathcal{O}(m+n)$