Assignment – 9

1. 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.

2. Connectivity in Undirected Graph

- Given an **undirected** graph $G = (V, E)$ in its adjacency list representation. Do the following –
  - Obtain the number of connected component in the graph G
  - Print the vertices in all the connected components of graph G
  - Given two nodes $u, v \in V$ (User input), find whether both the nodes are in the same component or not. This you need to answer in $\mathcal{O}(1)$ time. So store the obtained information in your process in an intelligent way.

3. Connectivity in Directed Graph

- Given an **directed** graph $G = (V, E)$ in its adjacency list representation. Do the following –
  - Obtain the adjacency list representation of G^T
  - Check whether the graph G is **strongly connected** or not
    - Using brute force technique
    - With the help of G^T in $\mathcal{O}(m + n)$ time where $n = |V|$ and $m = |E|$
  - Check whether the graph G is **weakly connected** or not
  - Find the number of **strongly connected components** in the graph G
    - Using brute force technique
    - With the help of G^T in $\mathcal{O}(m + n)$ time where $n = |V|$ and $m = |E|$