Programming Assignment 4
CSCE 350 : Data Structures and Algorithms
Spring 2023
Due Date - April 20

Instructions:

- The solutions should be very clear and should follow the instructions below and the requirements stated for each problem.
- If you refer to any resource to get your solutions, add an acknowledgement with your solutions (details of the source, e.g., book, website, etc.).
- All the codes should be written in c or $c++$ or JAVA for linux and commented appropriately for major steps/functions.
- Code that does not compile will not be graded and get a 0 automatically.
- The codes should be submitted as a single zipped file through Blackboard

Part A:

1. Implement Floyd's Algorithm for all pairs shortest paths using C or C++ or Java. (50 pts)

   ALGORITHM $Floyd(W[1,\ldots,n,1,\ldots,n])$
   $D \leftarrow W$
   for $k \leftarrow 1$ **to** n **do**
   for $i \leftarrow 1$ **to** n **do**
   for $j \leftarrow 1$ **to** n **do**
   $D[i,j] \leftarrow \min\{D[i,j], D[i,k] + D[k,j]\}$
   return D

   Requirements:

   (a) Your code should be able to read an input ASCII file named 'input.txt', which contains a distance matrix with non-negative floating-number distances and the diagonal entries are all zeros.

   (b) Your code will produce an output ASCII file named 'output.txt', which contains the final distance matrix for all pairs shortest paths.

   (c) A script file or readme file including the instructions to compile and run the code should be submitted together with the codes

2. Implement the $MaximumBipartiteMatching(G)$ in Section 10.3 in your text book in C or $C++$ or Java. (100 pts)

   Requirements:

   (a) Your code should be able to read an input ASCII file named 'input.txt', which contains the vertices from set V in the first row in the form of an array separated by space, the vertices from set V in the first row in the form of an array separated by space, and starting from third row, the adjacency matrix is stored as a two-dimensional array.

   (b) Your code will produce an output ASCII file named 'output.txt' containing the maximum matching of the input bipartite graph in the same format as the input.

   (c) A script file or readme file including the instructions to compile and run the code should be submitted together with the codes