METU Department of Computer Engineering
CENG 707 Data Structures and Algorithms
Homework 4 – Fall 2020
Deadline: 21.01.2021
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1) Graph Construction [20 points]

Read the file in http://www.ceng.metu.edu.tr/~ys/world-trade-dataset.txt as a directed graph into both Adjacency Matrix and Adjacency List structures. For the latter, you do not have to use a linked list; just use a vector< pair<int, int> > *adjVertexList* for each vertex, where the paired integers are adjacent vertex id and the corresponding edge weight. You may ignore the tokens after the vertex IDs.

2) Graph Queries [48 points]

Using both structures, print
   - The vertex/vertices with the highest degree, i.e., # of incident outgoing edges,
   - The vertices that are *n* edges far away from the vertex *i* (*i*, *n* user input; hint: use BFS),
   - Two vertices which are separated the most,
   - The vertex/vertices with the greatest number of shortest paths passing through it/them.

3) Shortest Paths [32 points]

Implement Dijkstra's shortest paths algorithm to create a pairwise distance matrix, where entry *i*, *j* stores the length of the shortest path from vertex *i* to vertex *j*. Write 2 different functions, one with a priority queue (stl is fine) and one with an array. Compare their timing (time.h). Note that this part is also necessary to answer the last 2 questions in part 2.

Submission: Email to ys@ceng.metu.edu.tr a link to the folder of your source code, executables and screenshots.