CSCE629 Homework 5 Solutions

**Exercise 22.5-7.** Find the Strongly Connected Components (SCC) of the graph G. Treat each SCC as a vertex and create a component graph. Topologically sort the virtual vertices and check if there is an edge between every consecutive vertex. Runtime complexity: O(|V| + |E|).

**Problem 22-3.**

→ proof

Suppose a graph has an Euler tour. The Euler tour can be decomposed as the edge-disjoint simple cycles. Thus, it is true that in-degree(v)=out-degree(v) for all v ∈ V.

← proof

Suppose in-degree(v)=out-degree(v) for all v ∈ V. Starting any vertex, we can make a cycle. If there is any vertex that has non-zero out-degree, we repeat to make a cycle from the new vertex. Finally, we will have an Euler tour by merging the cycles.

b.) Using the second part of the proof of a, we search all possible edge-disjoint cycles and merge them to construct an Euler tour.

**Exercise 23.1-11.**

If the endpoints of the edge added are u and v, adding them will create a circle. Run DFS from u to v, and if we find an edge with highest weight, we remove that edge. Runtime complexity: O(|V|).