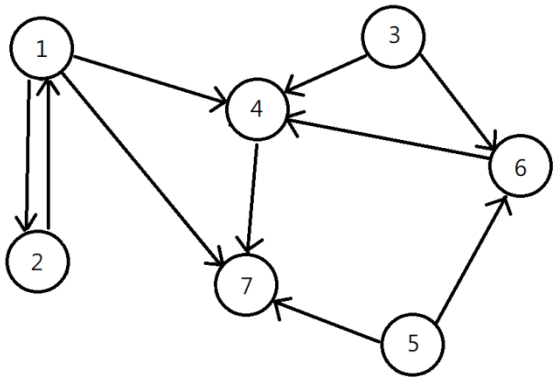
Chapter 22 Homework

Deadline: 2021/12/01

10:10 a.m

1. Given the directed graph below. (You can answer b, c problems in one graph.)
   a. Represent the graph using adjacency list.
   b. Do DFS to the graph and mark the discover time and finish time (discover time/finish time) on each node. If there are multiple nodes to choose for the next step, always visit the node with the smallest ID.
   c. Based on the answer of b, identify each edge as a tree-edge (T), a forward-edge (F), a back-edge (B), or a cross-edge (C).



2. Prove that for any directed graph G, we have $((G^T)^{SCC})^T = G^{SCC}$. That is, the transpose of the component graph of G^T is the same as the component graph of G.

3. Give an algorithm that determines whether or not a given undirected graph $G = (V, E)$ contains a cycle. Your algorithm should run in $O(V)$ time, independent of $|E|$.