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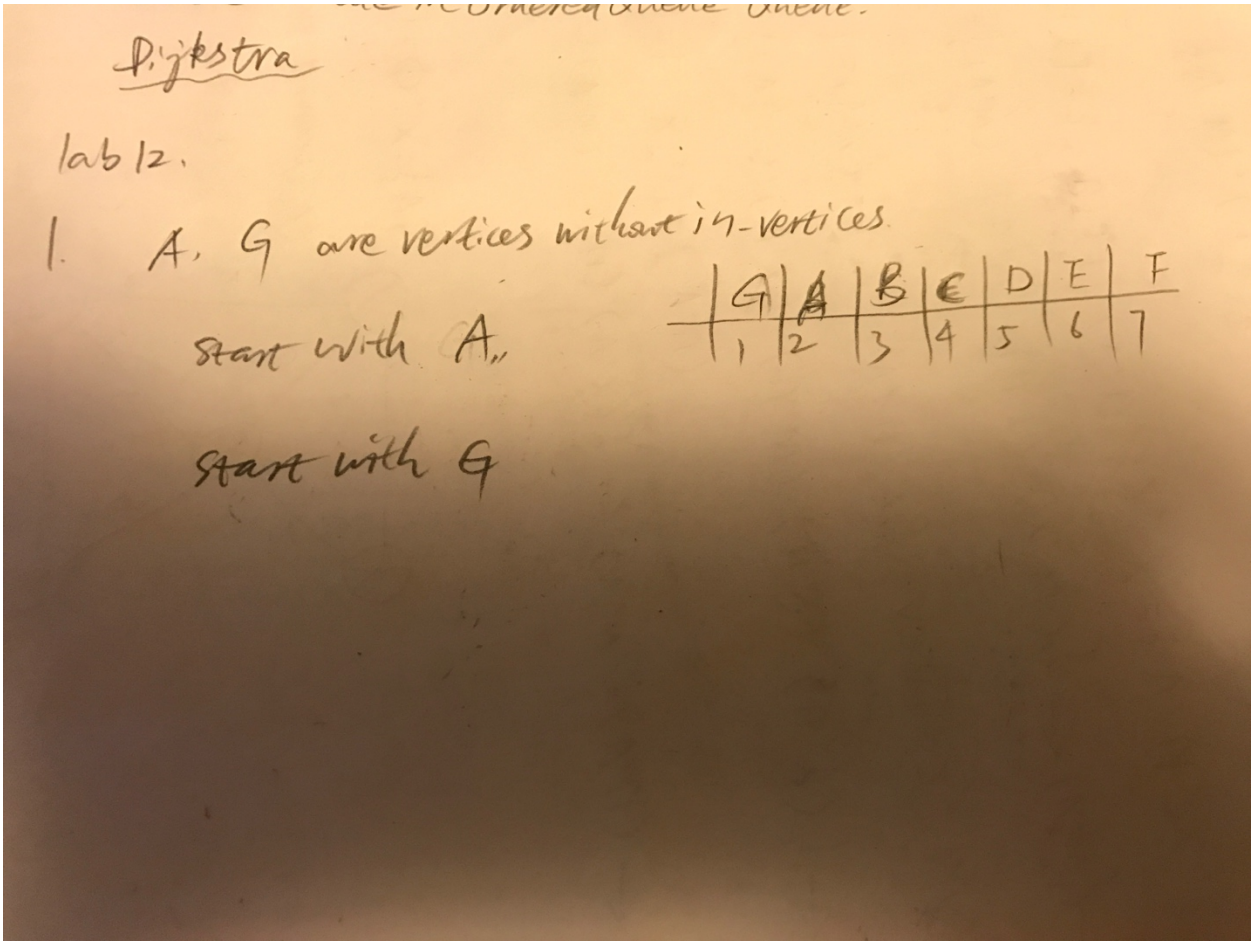
Problem 1

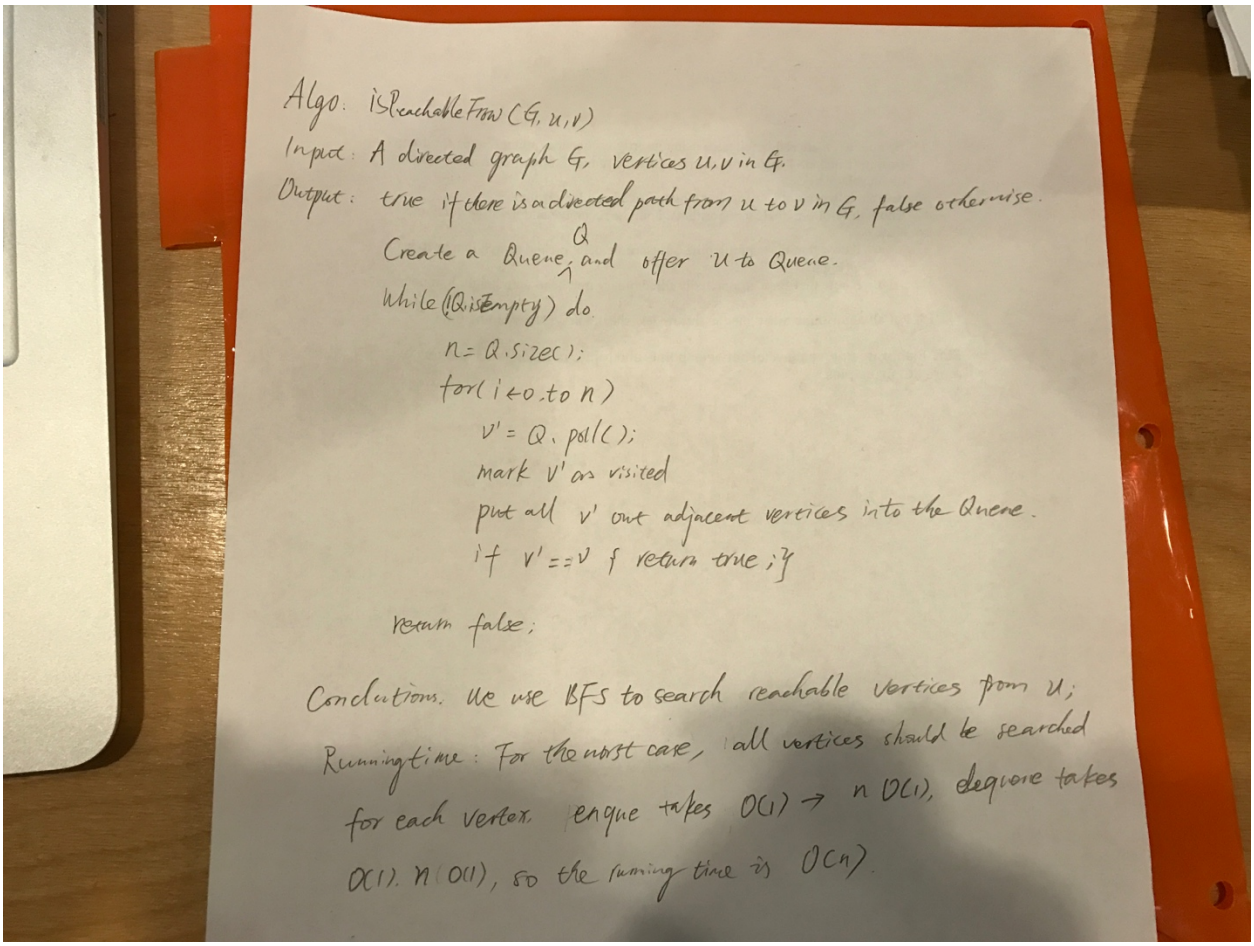
Perform the General Topological Sort algorithm on the following graph.



Problem 2

Devise an algorithm for the following problem. Then give the asymptotic running time of your algorithm, including an explanation of how you arrived at this running time. Algorithm: IsReachableFrom(G, u, v) Input: A directed graph G, vertices u, v in G Output: TRUE if there is a directed path from u to v in G, false

otherwise.



Algo: isReachableFrom(G, u, v)
Input: A directed graph G, vertices u, v in G.
Output: true if there is a directed path from u to v in G, false otherwise.

Create a Queue, Q, and offer u to Queue.
While(!Q.isEmpty) do
n = Q.size();
for(i ← 0..to n)
v' = Q.poll();
mark v' as visited
put all v' out adjacent vertices into the Queue.
if v' == v { return true; }

return false;

Conclusions. We use BFS to search reachable vertices from u;
Running time: For the worst case, all vertices should be searched for each vertex. enque takes O(1) → n O(1), deqiore takes O(1). n(O(1)), so the running time is O(n).