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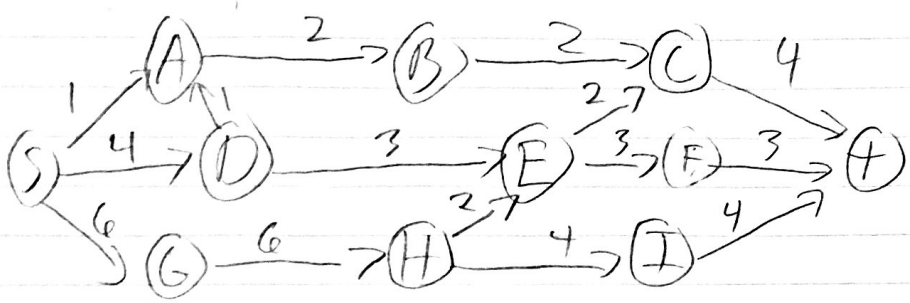
Section 003

Assignment 6

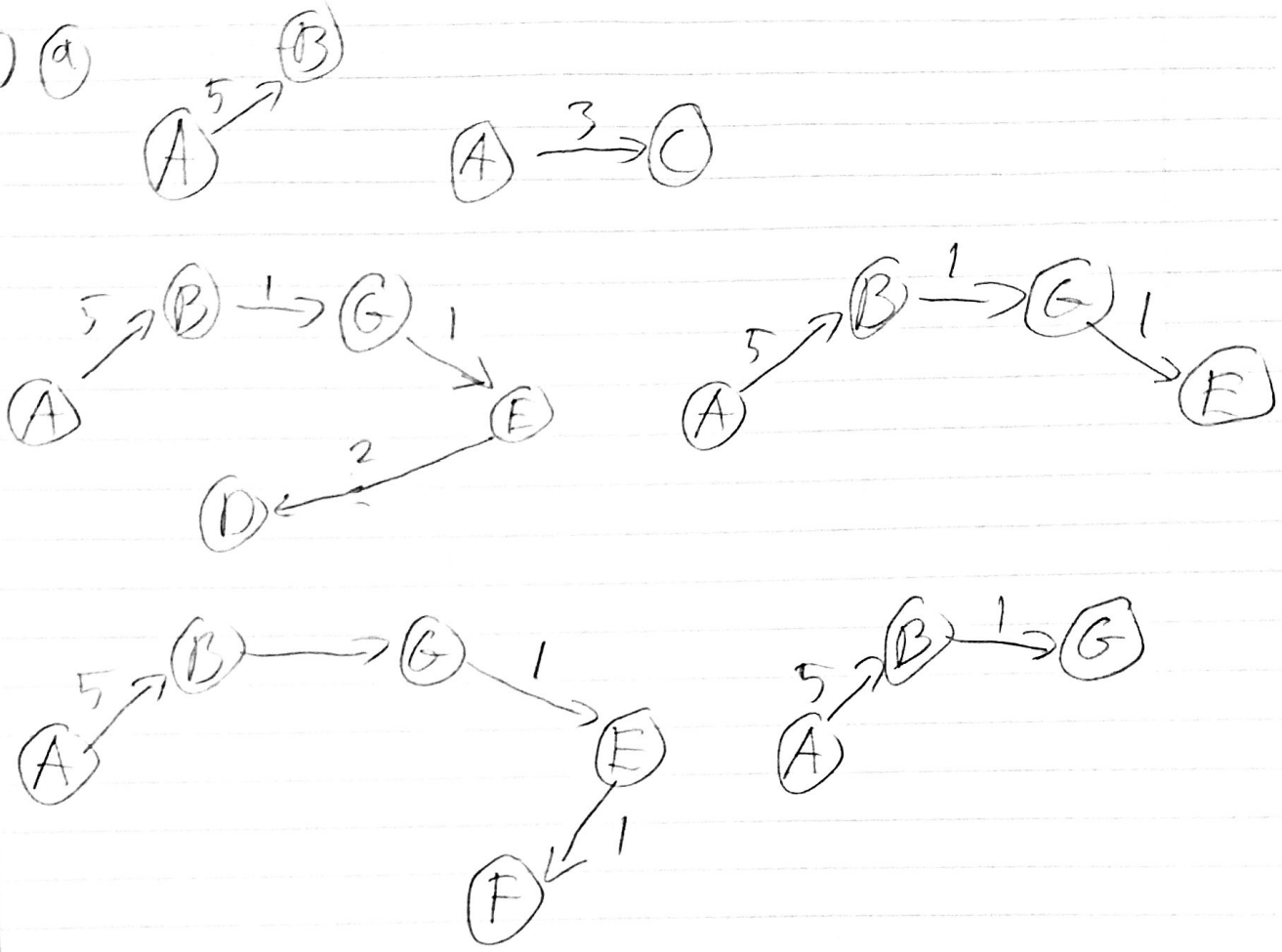
1) S, G, D, H, A, B, E, I, F, C, t

If a stack is used S, G, H, D, A, E, I, F, B, C, t
Topological sort uses a breadth first method which generally leads to a better ordering

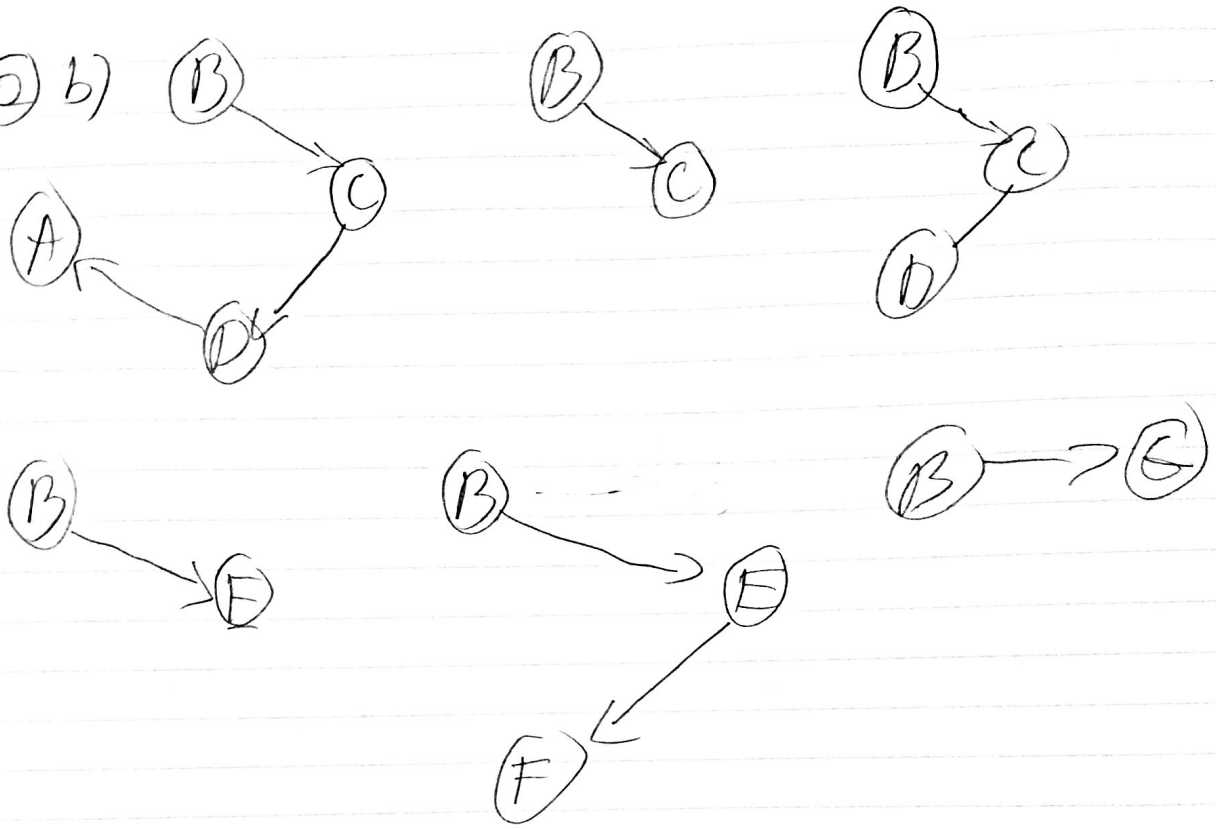


max flow is 11

2) (a)



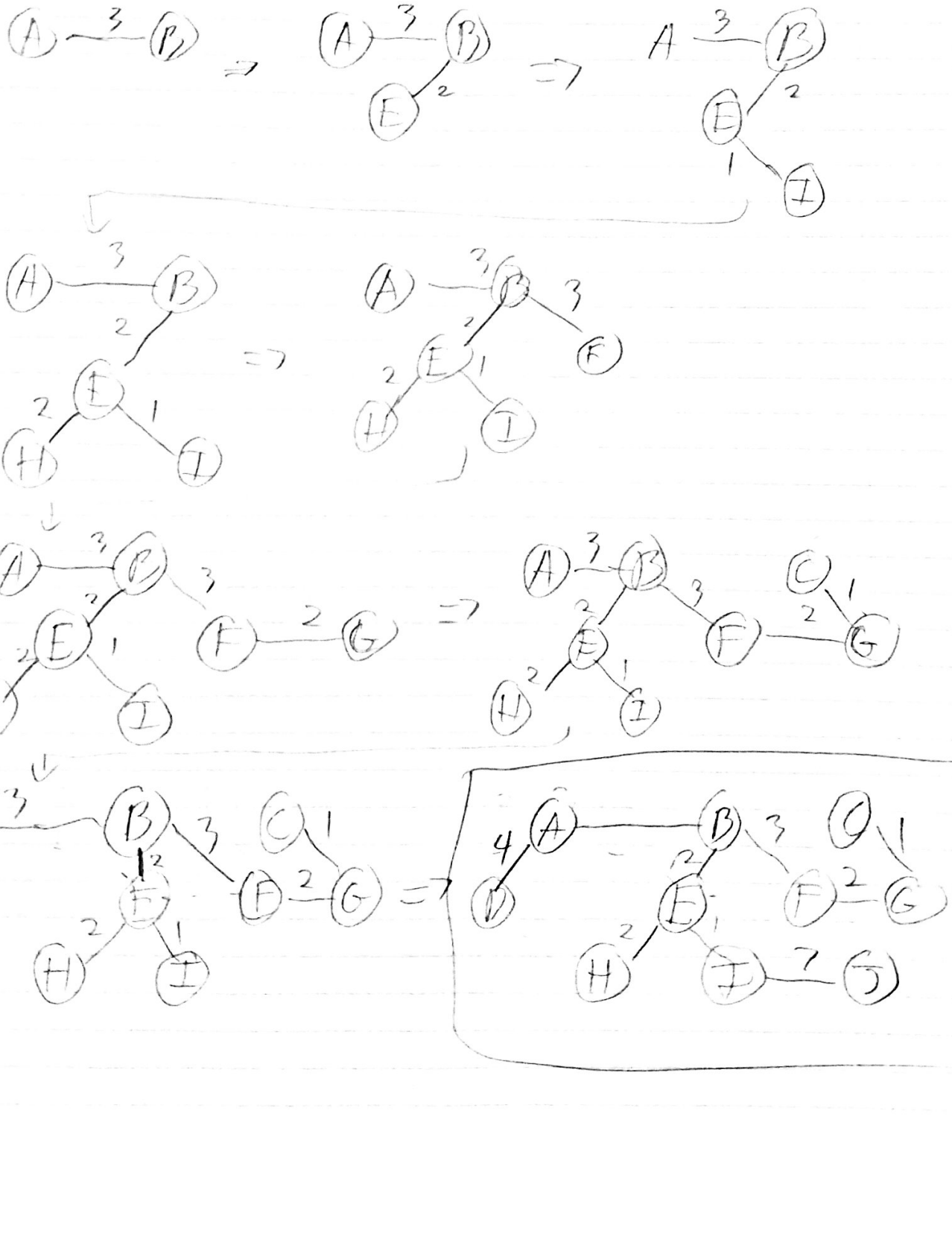
(2) b)



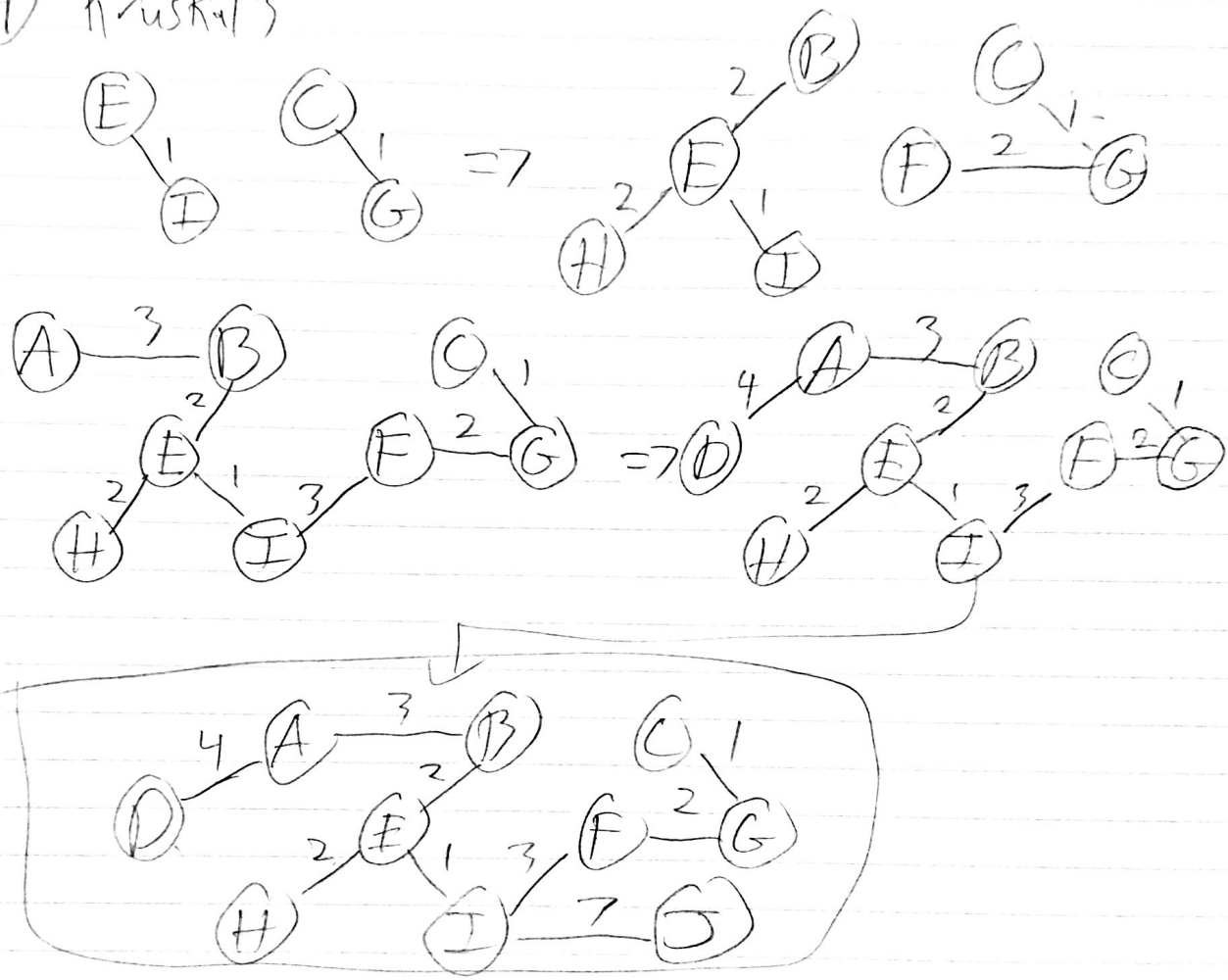
3) (a) To count the number of minimum paths from v to w, an array can be used. For any vertex "a", tally[a] would represent the number of distinct paths from S to a known so far, whenever a vertex v is marked as known, traverse its adjacency list. Let w be a vertex on the adjacency list.
If $dist_v + Count_{v,w} = dist_w$, then Count[w] is incremented by Count[v]
If $dist_v + Count_{v,w} < dist_w$, then the previous vertex and distance vertex are updated.
Now set Count[w] = Count[v]

b) Consider an Array NoEdges list for any vertex.
The NoEdge[a] is on a path of distance $dist_u$ from S to the vertex u, which is the shortest path edge. When a vertex is selected, NoEdge is used at the end of the limit.
-treat "v" as a vertex w/ neighbor "w"
If $dist_v + Count_{v,w} = dist_w$, alter previous vertex w to v and NoEdge[w] to NoEdge[v]+1 if NoEdges[v]+1 < NoEdges[w]
If $dist_v + Count_{v,w} < dist_w$, then update previous vertex w, distance w and set NoEdges[w] to NoEdges[v]+1

4) (a) Prim's



(9) Kruskal's


E
I
1
C
G
1
=>
B
2
E
H
2
1
I
C
1
F
2
G
A
3
B
2
E
H
2
1
I
3
F
2
G
C
1
=>
4
D
A
3
B
2
E
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G
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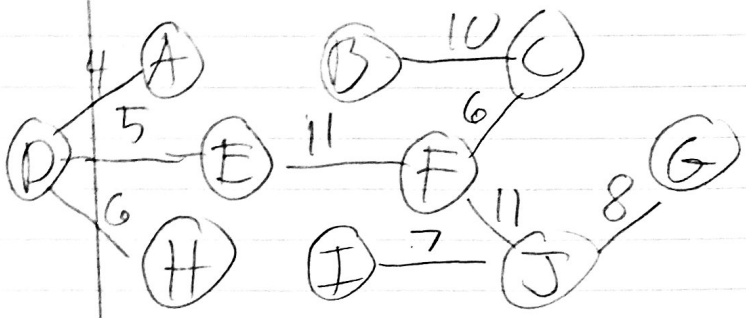
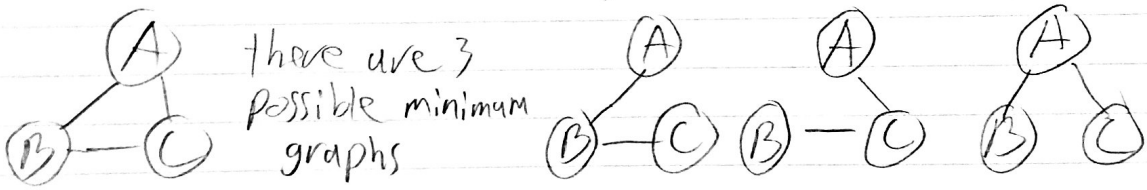
1
7

4) max tree



4) (b) the minimum paths are not unique. There are several possible paths with the same weight.

(c) consider the following graphs



there are 3 possible minimum graphs

for $V=3$ ther are $3^{3-2} = 3^1$