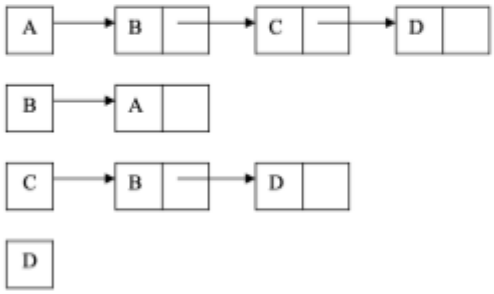
Sheet 6
Graphs

1 Question 1

Given a directed graph represented with the adjacency list



a) Draw the directed graph.

b) Draw the adjacency matrix of this graph.

c) Draw the edge list of the graph.

2 Question 2

Given the following incidence matrix. Vertices are labeled from A to I.

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10
A	1	1	1	0	0	0	0	0	0	0
B	1	0	0	0	1	1	0	0	0	0
C	0	1	0	1	0	0	0	1	0	0
D	0	0	1	1	0	0	0	0	1	1
E	0	0	0	0	1	0	1	0	0	0
F	0	0	0	0	0	1	0	0	0	0
G	0	0	0	0	0	0	0	1	1	0
H	0	0	0	0	0	0	0	0	0	1
I	0	0	0	0	0	0	1	0	0	0

a) Draw the graph.

b) What is the corresponding adjacency matrix?

c) Is the adjacency matrix symmetrical? Why?

d) If the graph is directed, what does the sum of each row of the adjacency matrix represent?

3 Question 3

Given the following adjacency matrices, determine whether the graphs are isomorphic or not? Explain your answer.

a)

$$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix} \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \end{pmatrix}$$

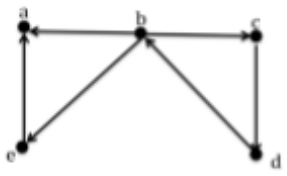
b)

$$\begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix} \begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$$

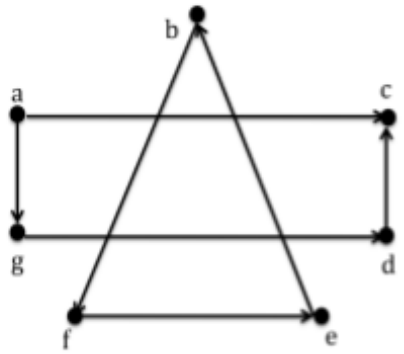
4 Question 4

Given the following graphs, determine whether each of them is strongly or weakly connected? Explain your answer.

a)

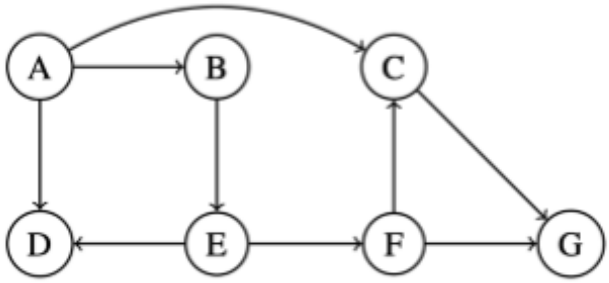


b)



5 Question 5

For the directed graph below, give a topological ordering of the vertices.



7 Notes

- You are required to submit a PDF of your answers and your ID in teams before 8:59 PM.
- You are encouraged to ask any questions on teams, or in person.

Good Luck