STRUKDAT GRAPH THEORY ASSIGNMENT

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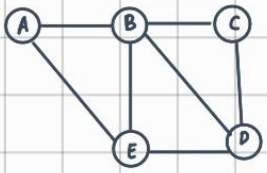
1)

	A	B	C	D	E
A	0	1	0	0	1
B	1	0	1	1	1
C	0	1	1	1	0
D	0	1	1	0	1
E	1	1	0	1	0



2) Because simple graph requires the sum of the degrees to be even number, here I will count the sum of the degrees of each node, if it's even, then it's possible to draw it. If the sum of the degrees is odd number, then it's not possible

a) 5, 2, 3, 2, 4 is possible to draw, because 5 + 2 + 3 + 2 + 4 = 16 (even number)

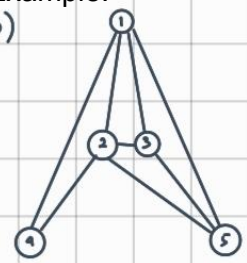
b) 4, 4, 3, 2, 3 is possible to draw, because 4 + 4 + 3 + 2 + 3 = 16 (even number)

c) 3, 3, 2, 3, 2 is impossible to draw, because 3 + 3 + 2 + 3 + 2 = 13 (odd number)

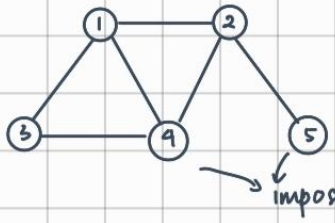
d) 4, 4, 1, 3, 2 is possible to draw, because 4 + 4 + 1 + 3 + 2 = 14 (even number)

Example:

b)



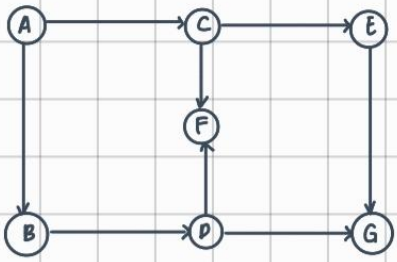
c)



3)

	A	B	C	D	E	F	G
A	0	1	1	0	0	0	0
B	0	0	1	1	1	0	0
C	0	0	0	0	1	1	0
D	0	0	0	0	0	1	1
E	0	0	0	0	0	0	1
F	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0

a)



b) [A] – B – C

[B] – C – D – E

[C] – E – F

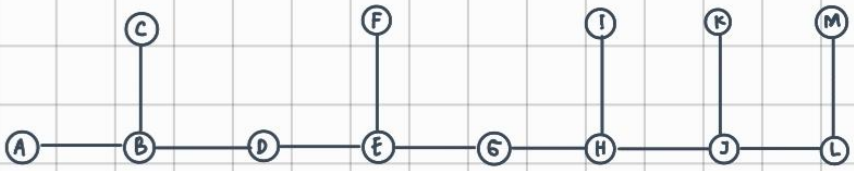
[D] – F – G

[E] – G

[F]

[G]

4)



5) .(i) Adjacency Matrix: The sum of entries in any row or column of the adjacency matrix equals the degree of the corresponding vertex, which is the number of edges incident to that vertex.

(ii) Incidence Matrix (Row Sums): The sum of entries in any row of the incidence matrix is always 0 because for each vertex, the number of incidences where it is the tail (assigned -1) balances out with the number of incidences where it is incident (assigned 1).

(iii) Incidence Matrix (Column Sums): The sum of entries in any column of the incidence matrix is 2 if the edge is a loop, -2 if it connects two distinct vertices, and 0 if it's not incident to a particular vertex

6) adjacency matrix

	1	2	3	4	5
1	0	1	0	0	1
2	1	0	1	0	1
3	0	1	0	1	0
4	0	0	1	0	1
5	1	1	0	1	0

incidence matrix

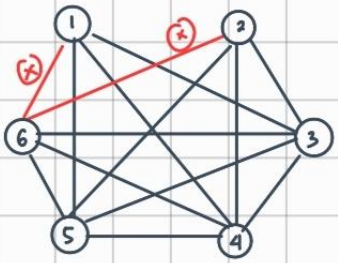
	e1	e2	e3	e4	e5	e6	e7
v1	1	1	0	0	0	0	0
v2	0	1	1	0	1	0	0
v3	0	0	0	0	1	1	1
v4	0	0	0	1	0	1	1
v5	1	0	1	1	0	0	0

7)

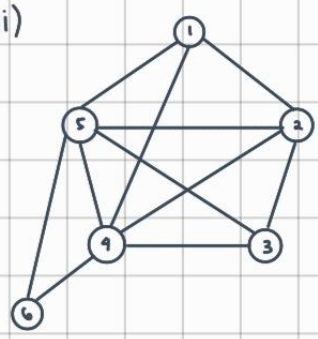
	1	2	3	4	5	6	7	8
A	0	0	1	1	1	1	1	0
B	0	1	0	1	0	0	0	1
C	0	0	0	0	0	0	0	1
D	1	0	1	0	1	0	1	0
E	1	1	0	0	0	1	0	0

8. i) The degree sequence (3, 3, 5, 5, 5, 5), if i sum it up, it will display an even number (26). However there's a problem because it suggests that two vertices must have a degree of 3, while the other vertices should have a degree of 5. In a simple graph, it's not possible for the first and second vertices to have a degree of 3 because the other vertices needs 5 and need to connect with them.

3 + 3 + 5 + 5 + 5 + 5 = 26



ii)



2 + 3 + 3 + 4 + 5 + 5 = 22 (possible to draw, because the sum of the degrees shows an even number)