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Department : BS(CS)

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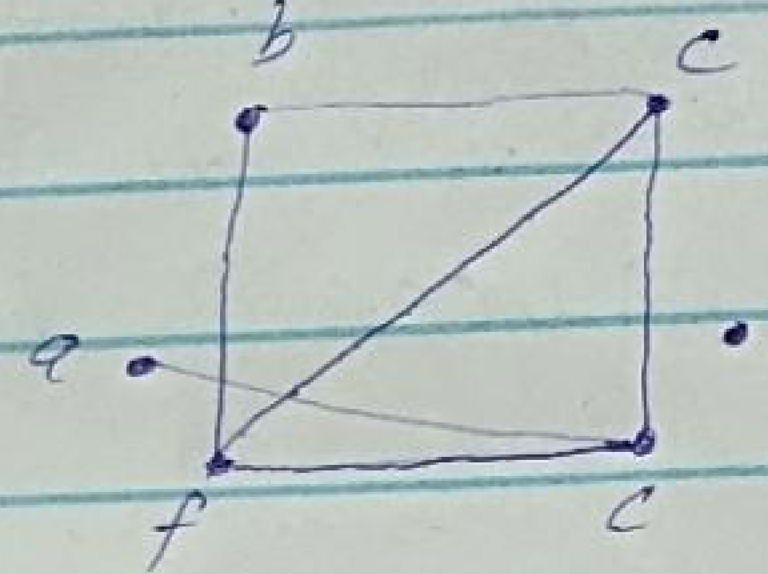
Assigament No: 2

Date : 24/6/2020

semester No: 2nd

Question No 1

(i)



Bipartite graph ∃ :

A bipartite graph is a simple graph whose vertices can be partitioned into set V_1 and V_2 such that there are ~~on~~ no edges among the vertices of V_1 and no edges among the vertices of V_2, while there can be edges between a vertex of V_1 and vertex of V_2.

A simple graph is bipartite if and only if it possible to

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to assign red or bule
to every to vertex
such that no two
connected vertices have
the same.
if two vertices are
connected then.
They should ~~be~~ not the
color.
we start by assging.
"blue" to a ~~8~~ since
b is connected to
the blue.
c is connected to the
we assign "Red" to be
since c is a connected
to the red b then
that f is connected
to the red b and the
blue c. which means that
we cannot assign.

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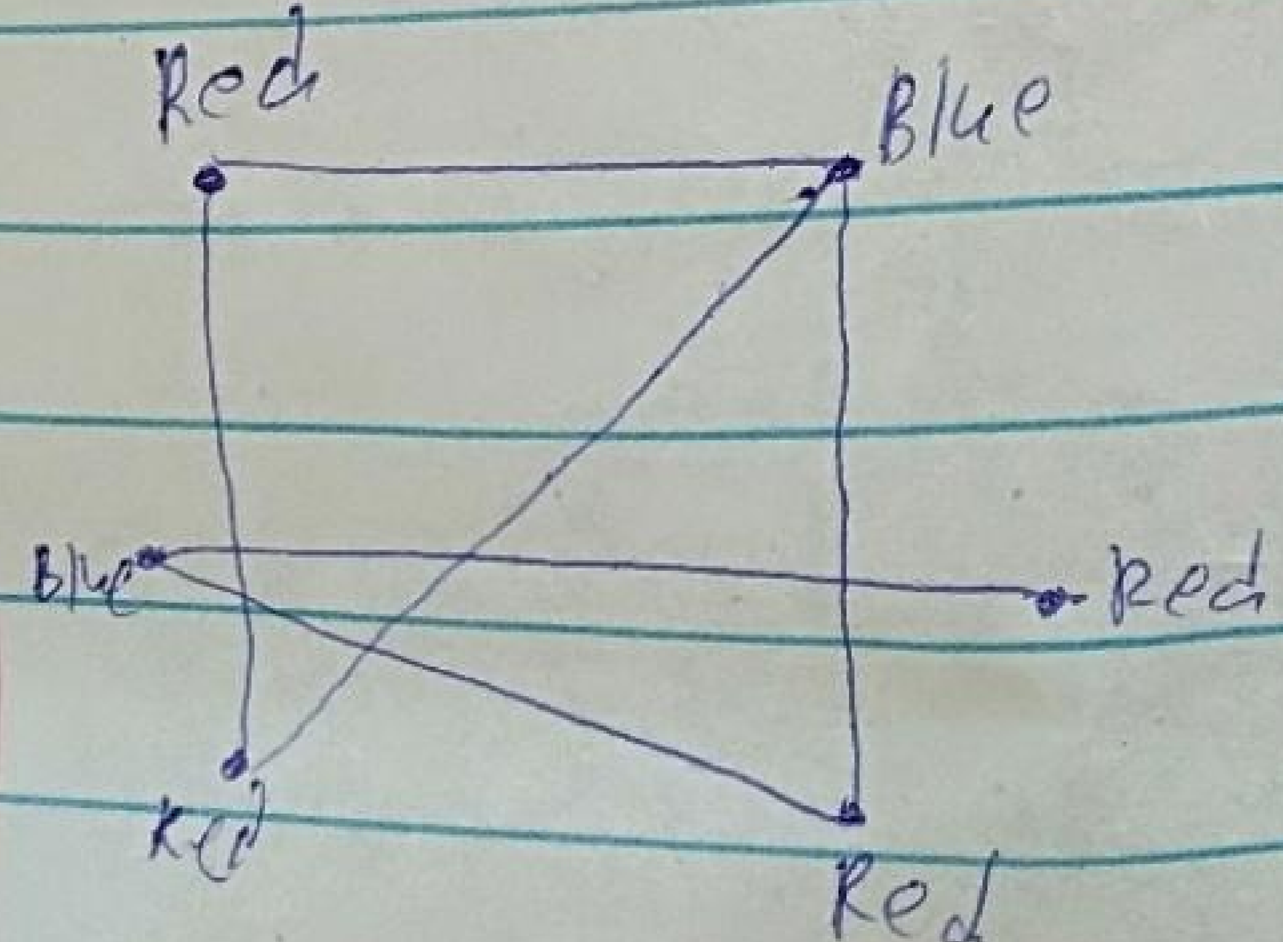
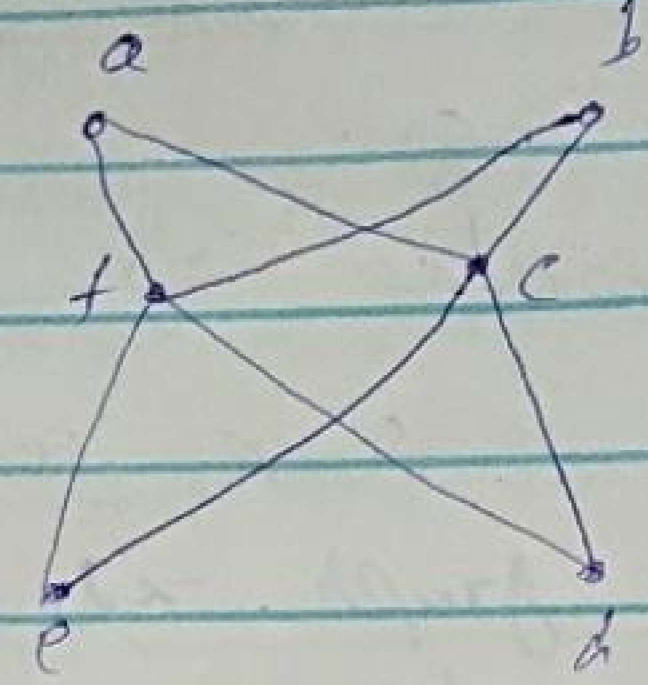
~~This~~ it is not possible to assign red.
connect vertices do not have the same color.

the graph is not bipartite.



(ii)



A simple graph is bipartite if and only if is possible to assign red or blue to every vertex such that no two connected vertice have the same colours

If two vertice on connected then should not have the same color we then note that is possible to assign red or blue to each vertice.

since colore ara thus graph is bipartite

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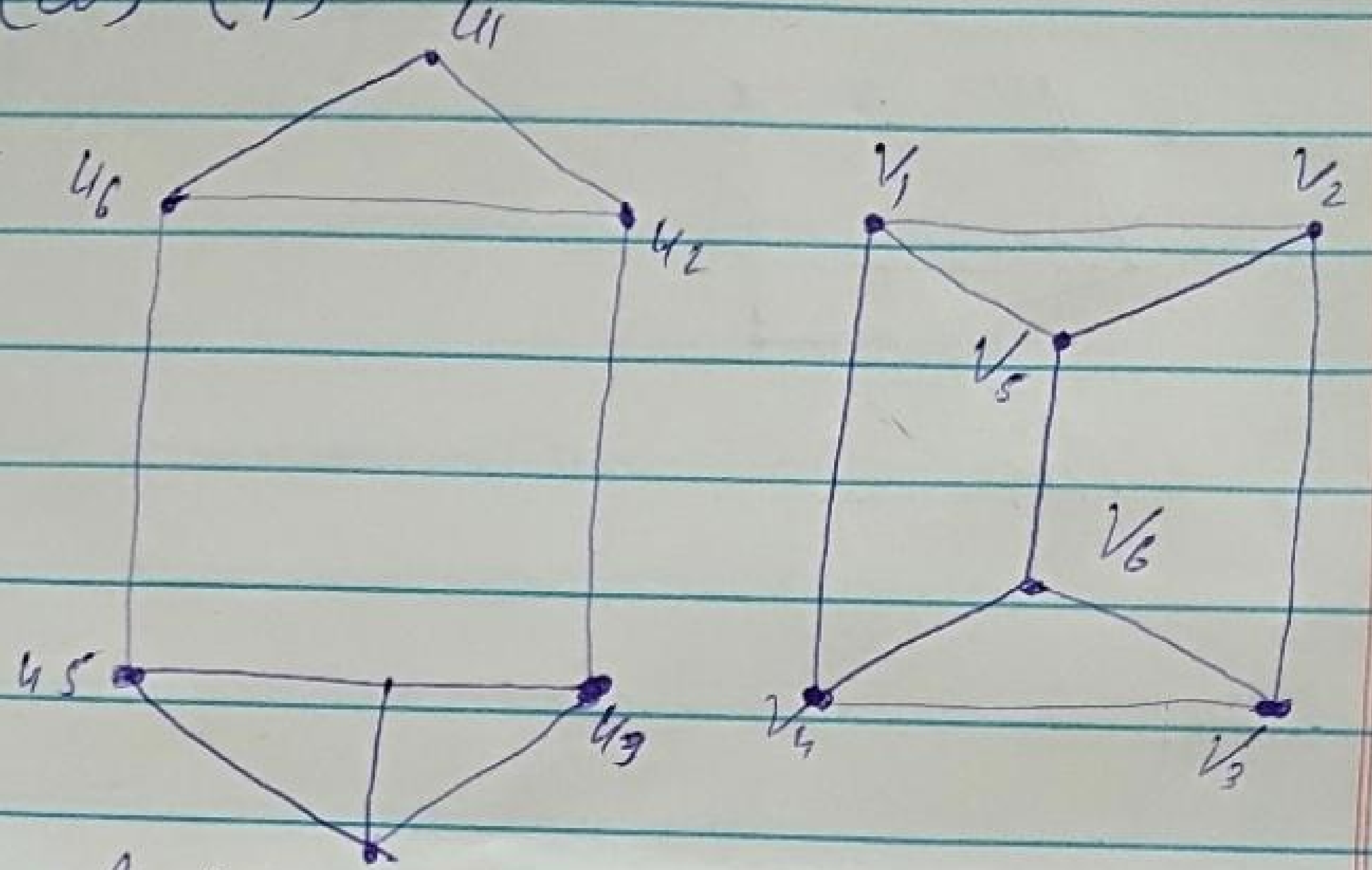
Question No 2

Graph is isomophic

(a) (i)



solution,

let us first determine set of vertices of edge

$V_1 = \{u_1, u_2, u_3, u_4, u_5, u_6\}$

$E_1 = \{(u_1, u_2), (u_1, u_4), (u_1, u_6), (u_2, u_3), (u_2, u_6)$
$(u_3, u_4), (u_3, u_5), (u_5, u_6)\}$

let us the first determine set of vetices and set of edge right graph.

$V_2 = \{v_1, v_2, v_3, v_4, v_5, v_6\}$

$E_2 = \{(v_5, v_2), (v_5, v_6) (v_2, v_3)$

$(v_2, v_3), (v_3, v_6), (v_3, v_4), (v_4, v_6)\}$

By computing the two set of edge we can

define the following.
one to one onto funcition f form V_1 to V_2

note: you could also use the degree of the vertices because and their image need to have same degree.

$f(u_1) = v_5$ $f(u_2) = v_2$

$f(u_2) = v_3$ $f(u_4) = v_6$

$f(u_5) = v_4$

$f(u_2) = v_1$

f is than funcition that make two graph

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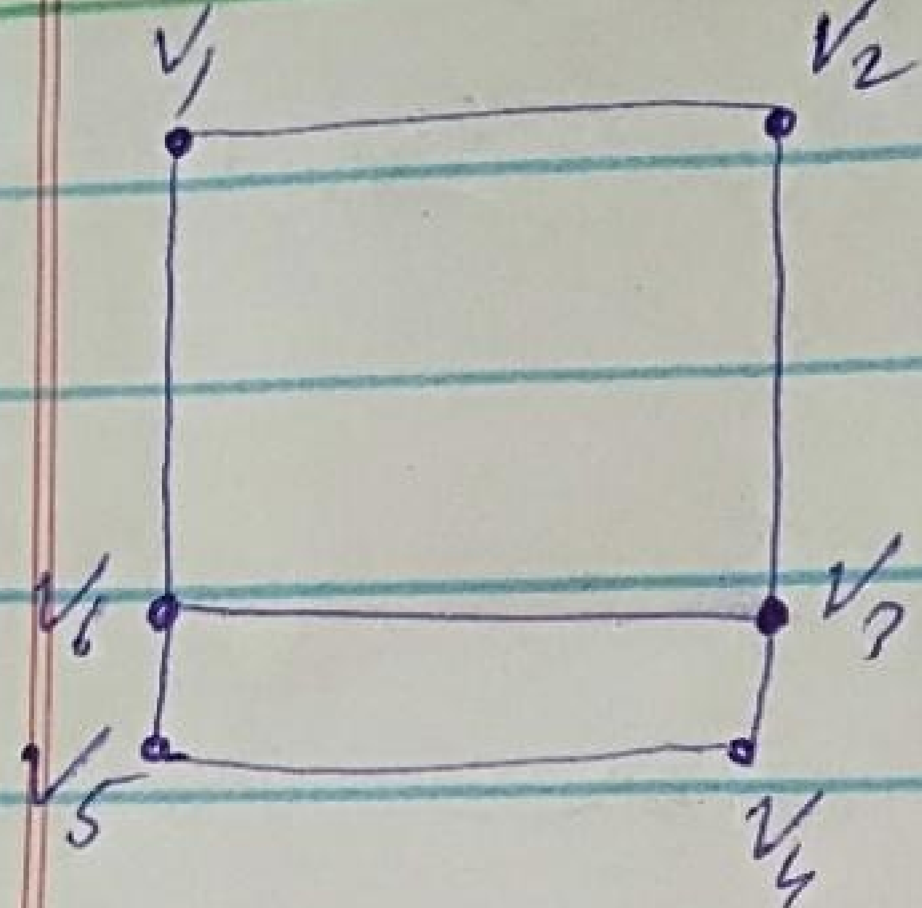

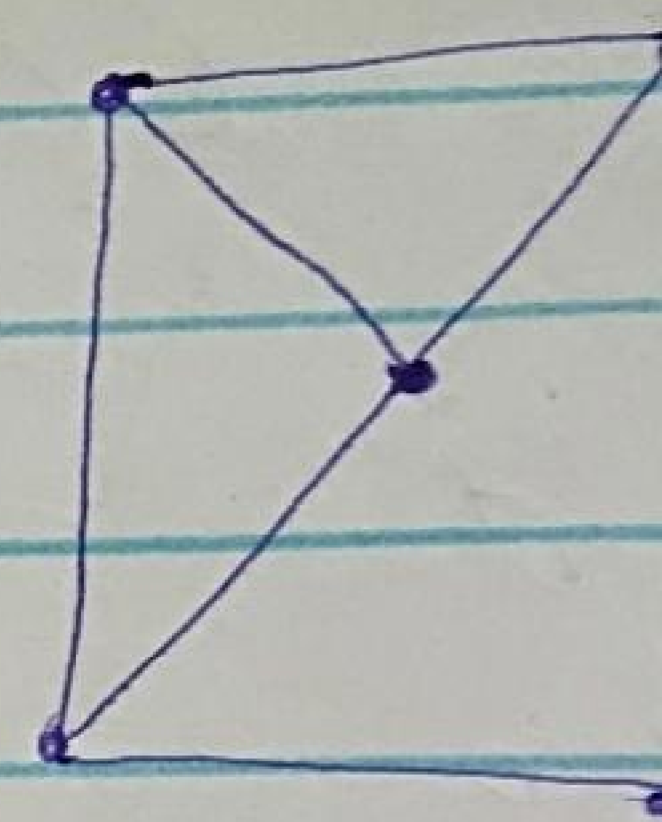

Question No 3

(a)

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

solution.

Let us add all element in the two matries which represent the number of connection of a vertex to another values which is double the number edge.

A contain 8 ones ~~are~~ and thus the simple graph corrstanding to A contain 8 connection.

B contains 10 ones and thus the simple

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corrspodding to A contain 10 connection.

since the number of connection of the two graph are not the same the number of connection.

the number of edges in the graph are not the same and the Graph are not isomorphic.

(b)

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

solution.

Let us

Add all element in the two matrics which will represent the number of connection of a vertex to another vertex.

A contain ones and thus the simple graph corrposding to A contain ~~B~~ 8 connection. ~~B~~

B contain ones and thus the simple graph corrposding to A contain 6 conection at the.

since the number

of connection at
the two graph are
not the same number
of edges in the graph
are not the same
and then the.
the graph are not
isomorphic.

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Question No 4.

Euler circuit ⇒

An euler circuit is a simple circuit has contain every edge of the graph.

A path in a directed graph G is a sequence of edges in G.

A simple path is a path that does not contain the same edge more than once. A circuit is a path that begin and ends in the same vertex.

The degree of a vertex is the number of edges that connect to the vertex.

Let us that connected to the vertex of every vertex first determine in the degree.

deg (a) = 2 deg (b) = 4

deg (c) = 2 deg (d) = 4

deg (e) = 4 deg (f) = 4

deg (g) = 2 deg (f) = 4

deg (i) = 2

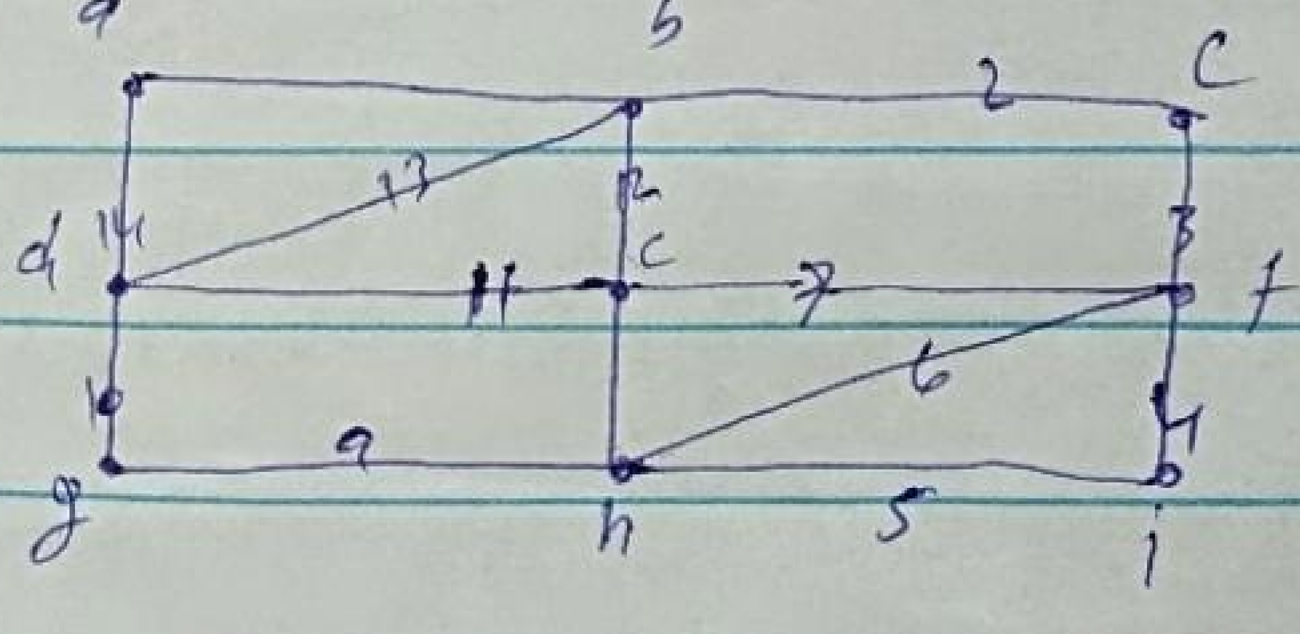
A graph has an euler circuit if and only if each of the vertices even degree. since degree are even exist on Euler circuit.

deg (g) = 2 deg (b) = 4

deg (i) = 2

A graph has Euler circuit if and if each of the vertices has an even degree.
since all degree are even there exist Euler circuit.

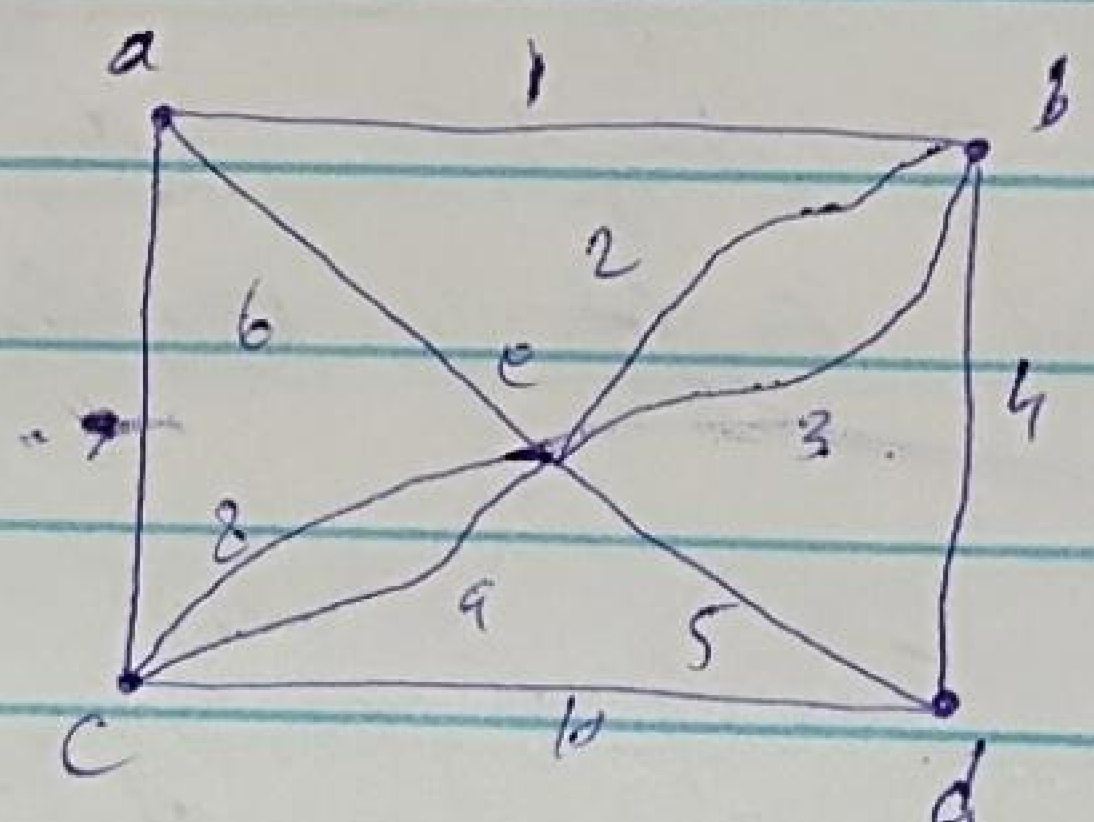
A possible Euler circuit is
a, b, c, f, i, h, b, f, c, h, g, c, b, d, a



This is Euler circuit exist.

A possible Euler path is,

a, b, c, b, d, e, a, c, e, e, d



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(b) Question No 5.

Let us first determine the degree of every matrix.

deg (a) = 2 deg (b) = 4

deg(c) = 2 deg (d) = 3

deg(e) = 3

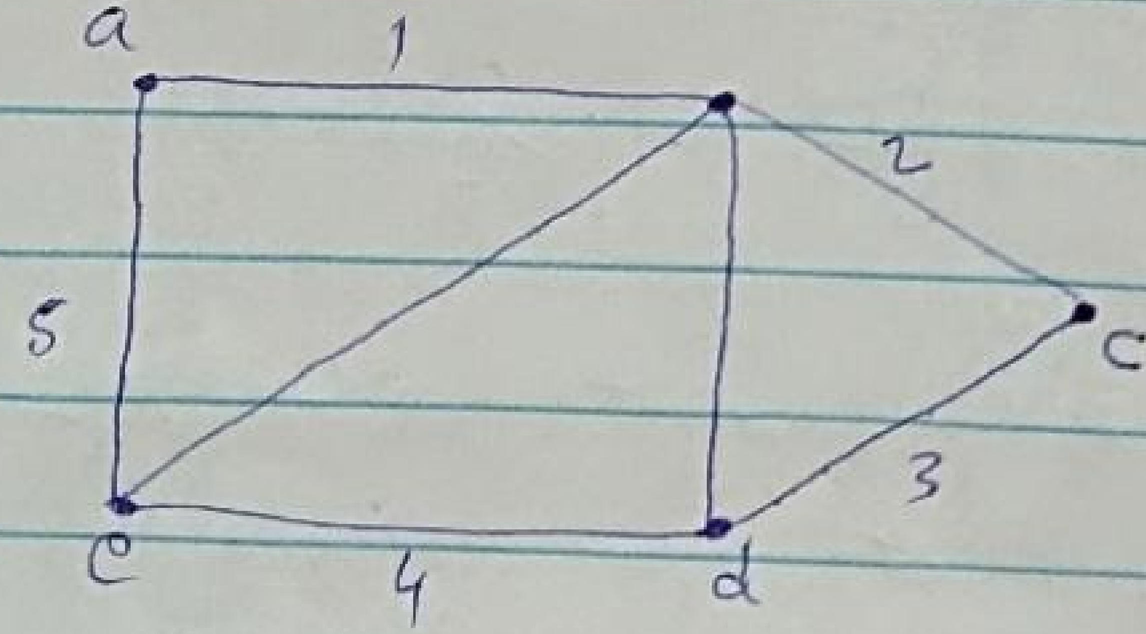
we then note that Drace therom is not satified less ~~this does not~~

then $n/2 = \frac{5}{2} = 2.5$

but.

This does not necssarily mean that no Hamilton circuit exist However. we do note that give graph contain the cycle is and

and they cycle c5
with in the give graph
contain the cyclecs with
given graph form an
Hamilton circuit can the
circuit will pass through
all vertices exactly once
A possible Hamilton circuit
is thus the path
C5: a, b, c, d, e, a.



This is Hamilton
circuit exist.