DISCRETE MATHEMATICS

PRACTICE CLASS 1

Group: ARA

Date: 06/02/2024

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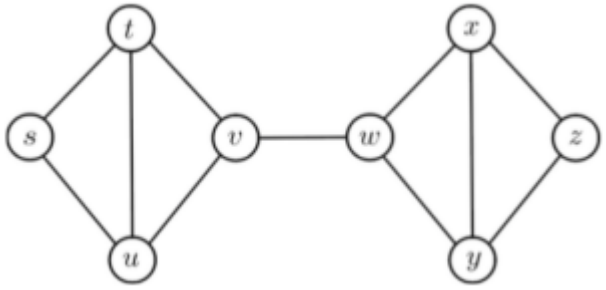
Problem 1



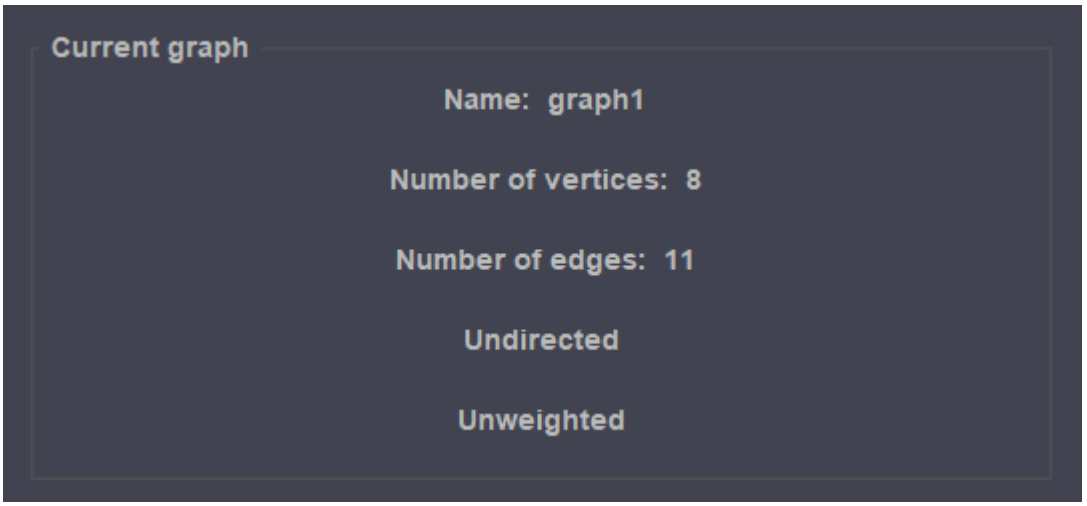
i) V = {t,s,u,v,w,x,y,z,x}
E={{s,t},{t,u},{t,v},{s,u},{u,v},{v,w},{w,x},
{w,y},{y,x},{y,z},{z,x}}.

ii) - The graph is directed F
  - The graph is undirected T
  - The graph is mixed F
  - Vertices v and w are adjacent T

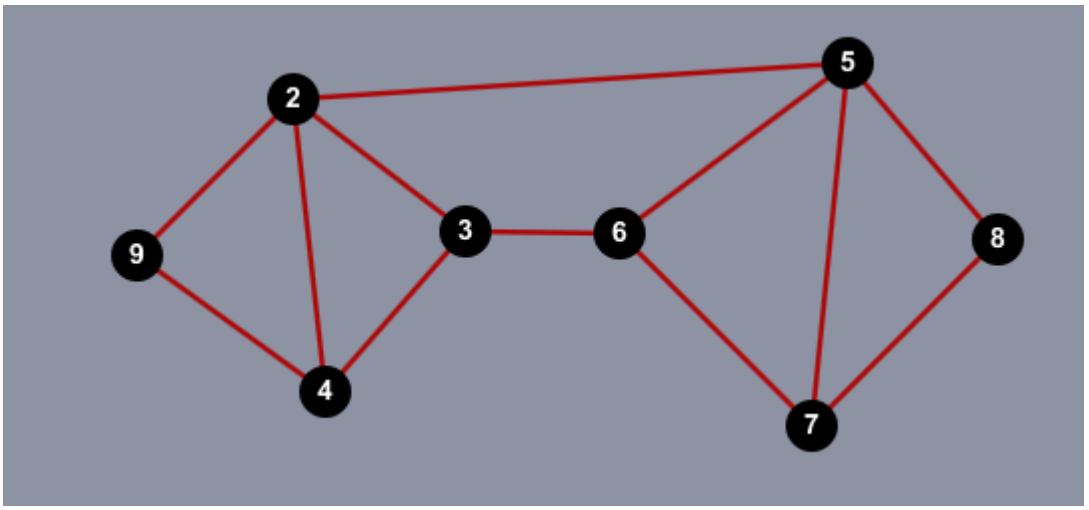
- t and u are not adjacent F

iii) -That graph has **8** vertices.
- It has **0 arcs and 11 edges**.
- Vertex v is adjacent with vertices **u,t,w.**
- Vertex w is adjacent with vertices **v,x,y.**

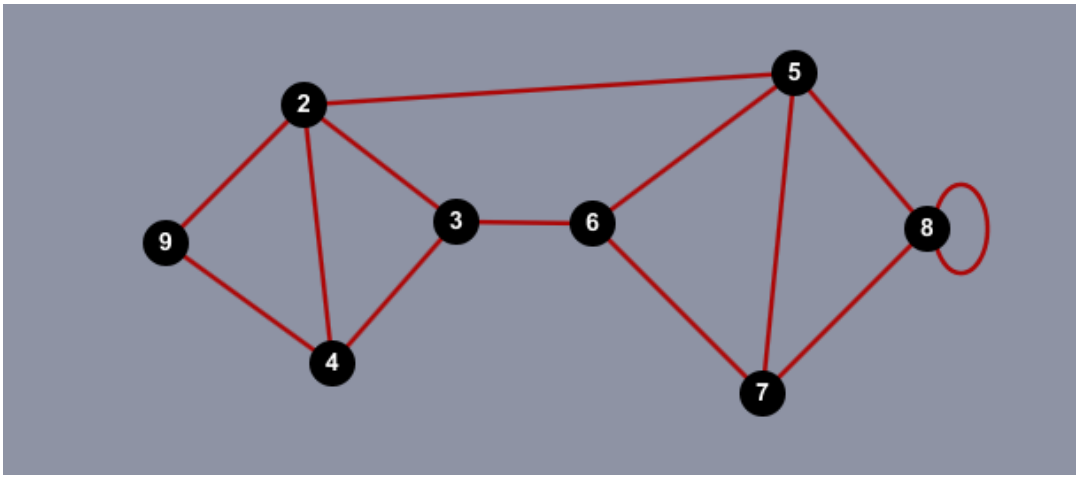
iv)



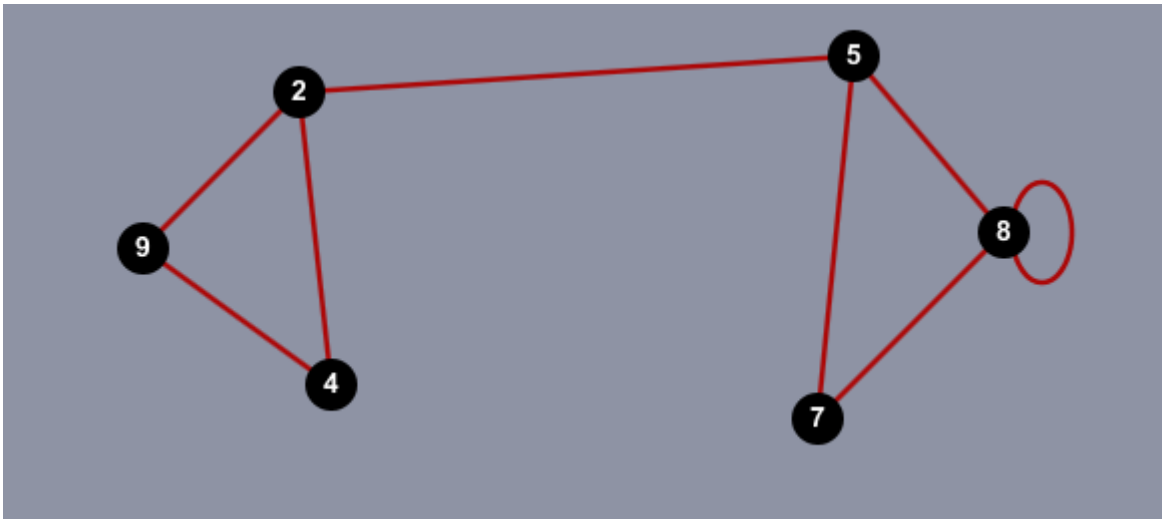
v)



vi)



vii & viii)

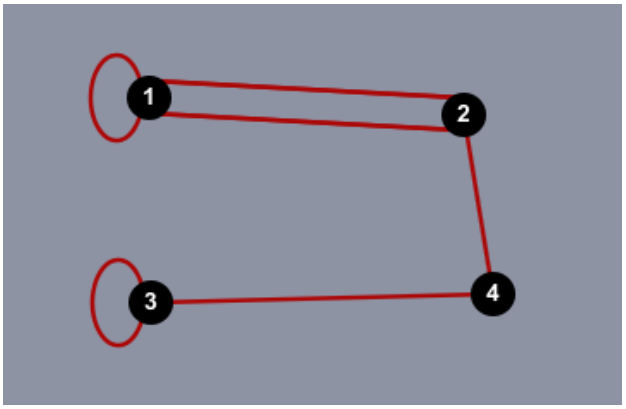


ix) Graph2 is a **directed** graph.
The mathematical notation is V = {s,t,u,x,y,z},
E = {{s,t},{s,u},{u,t},{x,t},{y,x},{z,z},
{z,x},{z,y}}.
This graph is multigraph because vertex z has a loop.

Problem 2

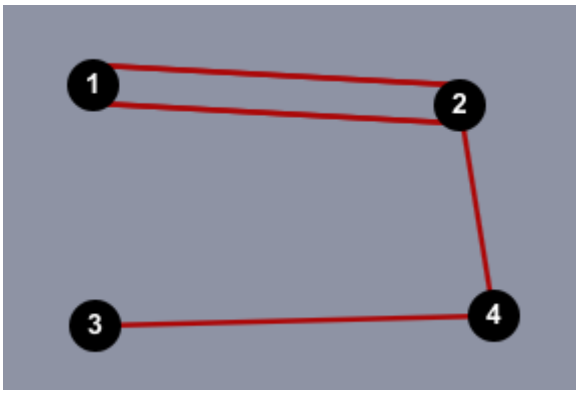
V = {1,2,3,4}.
E = {{1,1},{1,2},{2,1},{3,3},{3,4},{2,4}}.

i & ii)



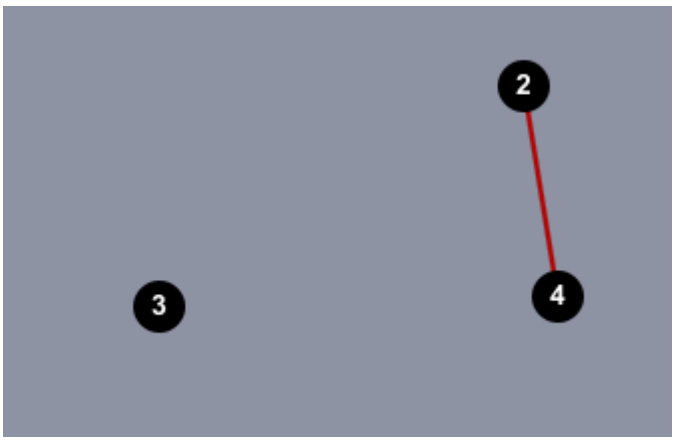
iii) This graph is not simple because **vertices 1 and 3 have loops.**

iv & v)



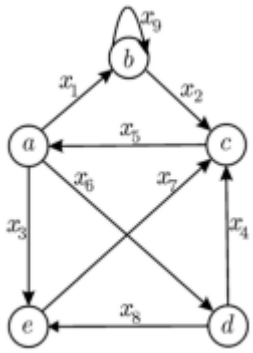
vi) This graph is **multigraph** because vertices 1 and 2 have more than one edge.

vii)



viii) This graph is **simple** because it has no loops and any vertices have more than one edge.

Problem 3



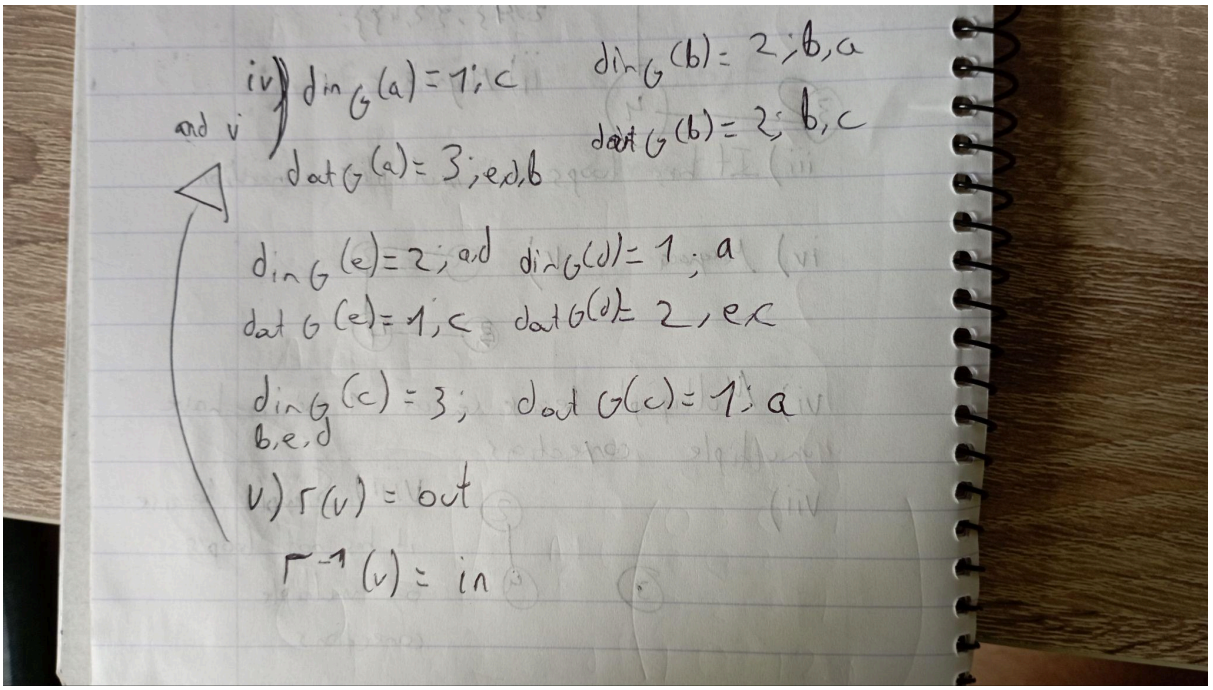
i) x2, x5, x7, x4. x2, x7 and x4 are terminus, x5 is origin.

ii) It is not because vertices b and e are not adjacents.

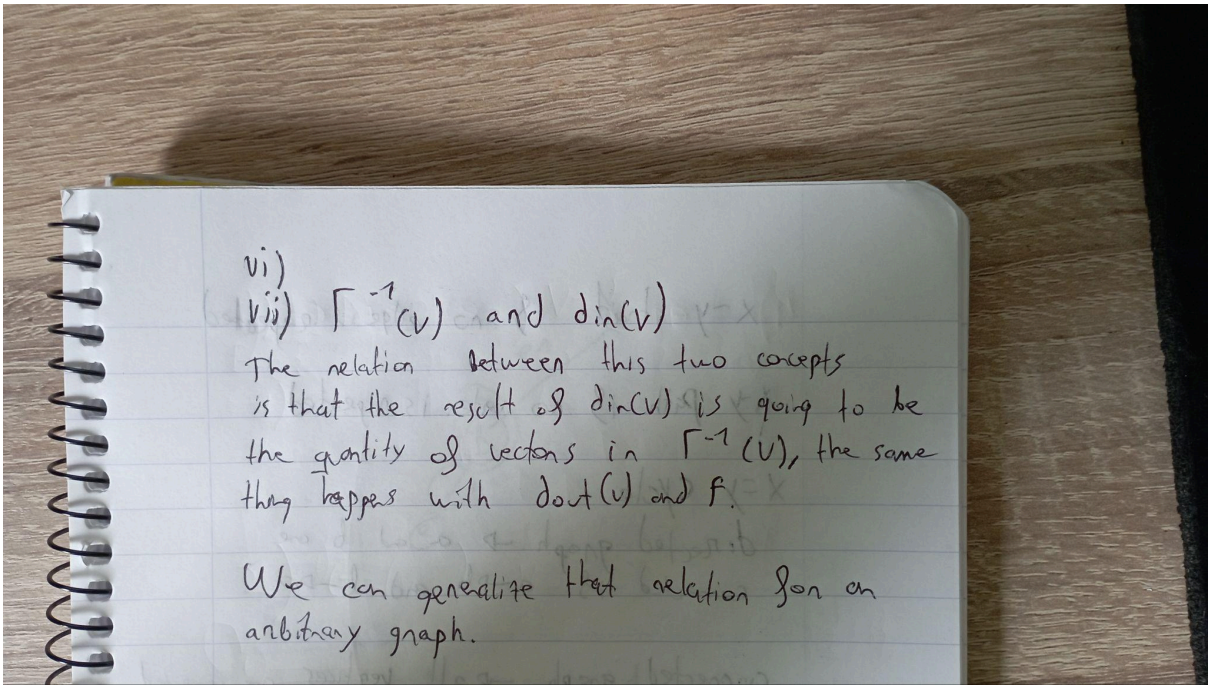
iii) It is not bipartite because we can not prove the algorithm. If we set the vertex 1

with 1 all the other vertex are set with 2, and we find that there are adjacent vertices set with 2.

iv & v)



vi & vii)



Problem 4

Problem 4. Consider a graph with 7 edges and 6 vertices. This graph has 5 vertices with degree 2. Compute the degree of the last vertex.

We have to use the following formula:

$$\sum_{v \in V} d_G(v) = 2\,card(E)$$

E = 7, $\sum_{v \in V} d_G(v)$ = 5*2 + x; 10 + x = 14; x = 4

The left part of the formula means the sum of all the vertices multiplied by their respective degrees, then the degree of the las vertex is 4.