L-22 Sub Graphs

Tuesday, March 29, 2022 10:04 AM

$G(V, E)$ $H(V, E)$

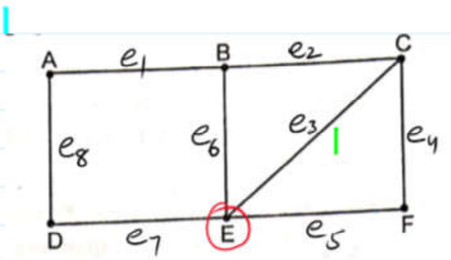
① $V(H) \subseteq V(G)$, $E(H) \subseteq E(G)$ H is Subgraph of G

② $V(H) \subset V(G)$, $E(H) \subset E(G)$ " " Proper Subgraph "

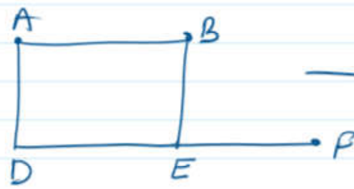
③ $V(H) = V(G)$, $E(H) \subset E(G)$ " " Spanning " " "

Define G-V

G-V is a subgraph of G obtained by deleting the vertex V from vertex set V(G) and deleting all the edges in E(G) which are incident on V.

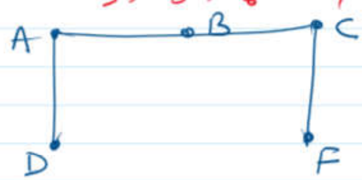


① G-C e_2, e_3, e_4 are Incident on C



→ Subgraph of G
Proper Subgraph

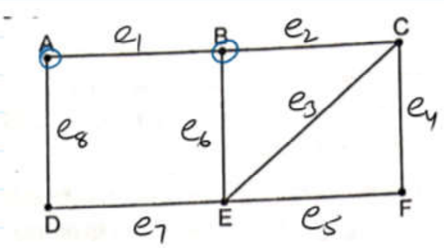
② G-E e_3, e_5, e_6, e_7



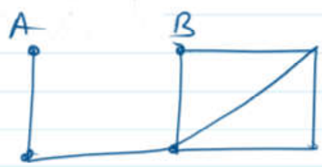
Cut Vertex

A vertex V is called a cut vertex for G if G-V is disconnected graph. → graph is divided into several parts

Define G – *e* : *e* is an edge in G. G– *e* is the graph obtained by simply deleting *e* from edge set of G.



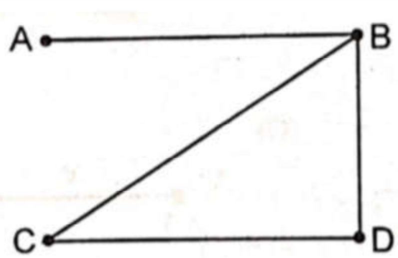
① $G - e_1$

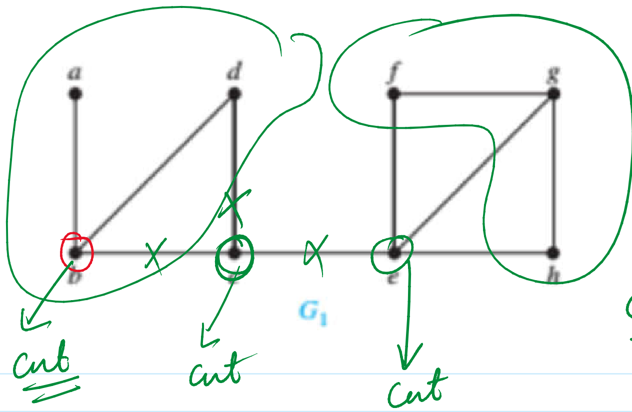


→ Spanning Subgraph

Cut Edge / Bridge ↦

An edge 'e' is said to be Cut edge (Bridge) if G-e is a disconnected graph.

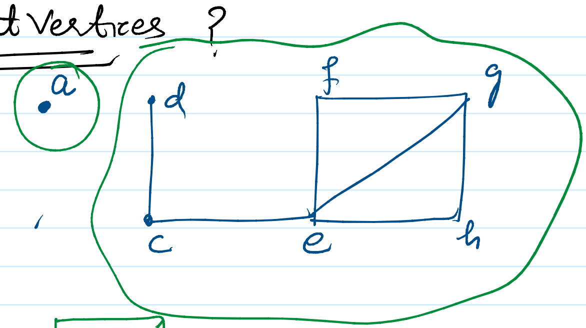




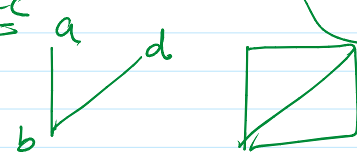
b, c, e

No. of Cut Vertices ?

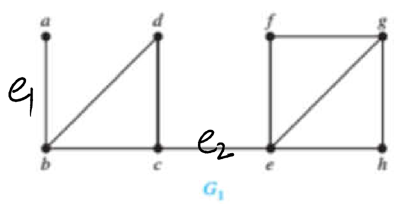
G-b

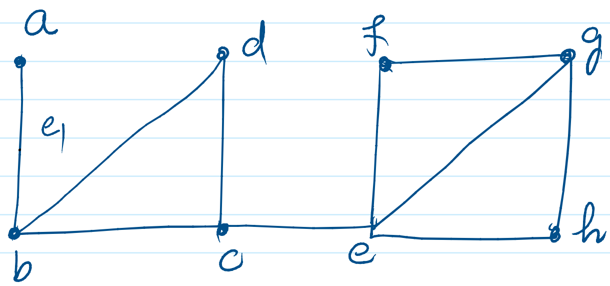


G-c



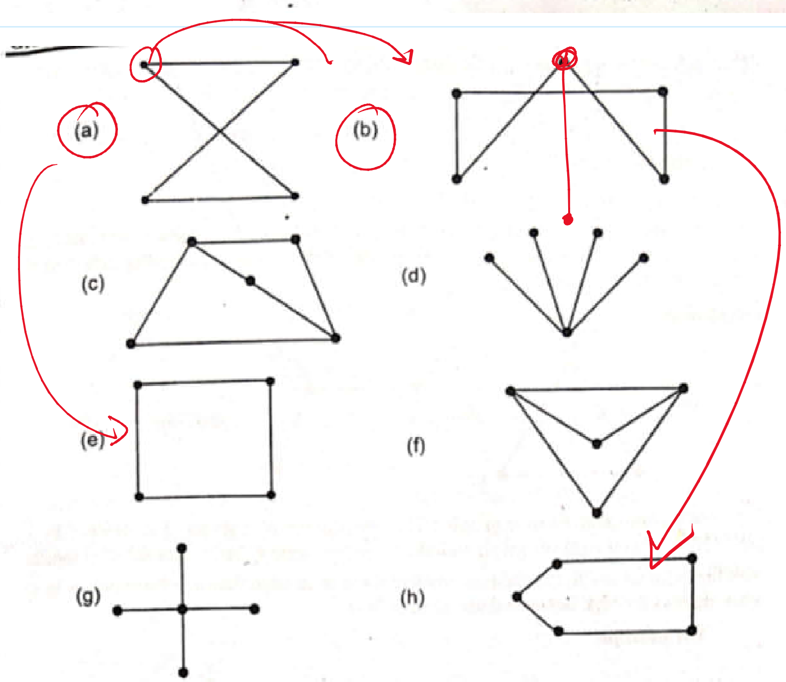
16) The number of cut edges in the graph G1 is

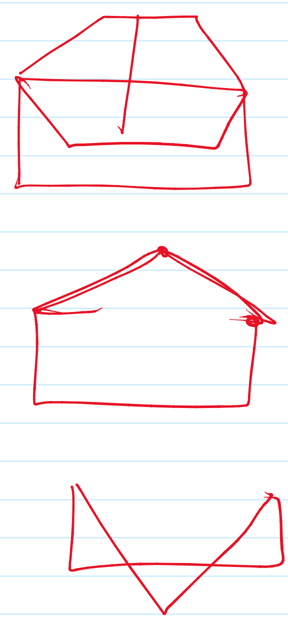




a) 1 b) 2 c) 3 d) 4

Example 7. Which of the following pair of graphs are isomorphic ?





Operation of graphs :→

(i) Union of two graphs : Let $G_1 = (V(G_1), E(G_1))$ and (*i*) **Union of two graphs :** Let $G_1 = (V(G_1), E(G_1))$ and

$$G_2 = (V(G_2), E(G_2)) \text{ be two graphs.}$$

Then their union is denoted by $G_1 \cup G_2$, is a graph

$$\boxed{G_1 \cup G_2} = (V(G_1 \cup G_2), E(G_1 \cup G_2))$$

such that $V(G_1 \cup G_2) = V(G_1) \cup V(G_2)$ and

$$E(G_1 \cup G_2) = E(G_1) \cup E(G_2)$$

In other words, union of two graphs is a graph whose vertex set is the union of the vertex sets of the two graphs and edge set is the union of the edge sets of the two graphs.

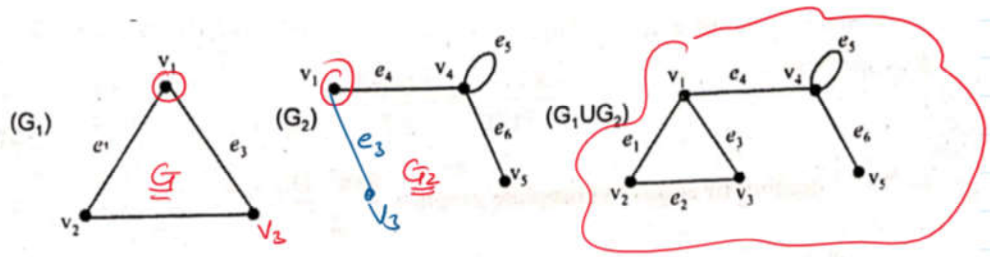
(*ii*) **Intersection of two graphs :** Let $G_1 = (V(G_1), E(G_2))$ and $G_2 = (V(G_2), E(G_2))$ be two graphs. Then their intersection is denoted by $G \cap G_2$, is a graph

$$G_1 \cap G_2 = (V(G_1 \cap G_2), E(G_1 \cap G_2))$$

such that $V(G_1 \cap G_2) = V(G_1) \cap V(G_2)$

$$E(G_1 \cap G_2) = E(G_1) \cap E(G_2).$$

In other words, intersection of two graphs is a graph whose vertex set is the intersection of the vertex sets of the two graphs and edge set is the intersection of the edge sets of the two graphs.



$V_1 \; V_2 \; V_3$
$V_1 \; V_4 \; V_5$] → $V_1 \; V_2 \; V_3 \; V_4 \; V_5$

$G_1 \cap G_2$

V_1

(*iii*) **Complement of a graph :** The compliment of a graph G is denoted by ($\bar{G}$) and is defined as the simple graph with the vertex set same as the vertex set of G together with the edge set satisfying the property that there is an edge between two vertices in $\bar{G}$ when there is no edge between these vertices in G.

A

$\bar{A}$ A'

Not A

For example