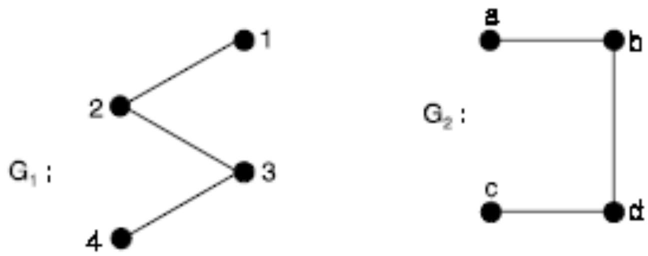
Assignment 1:

Problem 1. *Show that the two graphs shown in Figure are isomorphic.*



$V(G_1) = \{1,2,3,4\}$

$V(G_2) = \{a,b,c,d\}$

$E(G_1) = \{\{1,2\},\{2,3\},\{3,4\}\}$

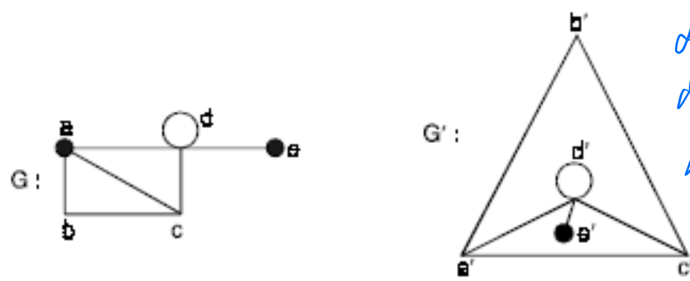
$E(G_2) = \{\{a,b\},\{b,d\},\{d,c\}\}$

Define a function $f: V(G_1) \to V(G_2)$

$f(1)=a$ $f(2)=b$ $f(3)=d$ $f(4)=c$

So it is an isomorphic

Problem 2. *Show that the following graphs are isomorphic.*



deg(G)	deg(G')
deg(a)=3	deg(a')=3
deg(b)=2	deg(b')=2
deg(c)=3	deg(c')=3
deg(d)=5	deg(d')=5
deg(e)=1	deg(e')=1

There have same numbers of vertices. edges and circuit

So, the correspondle is a-a' b-b' ... e-e'

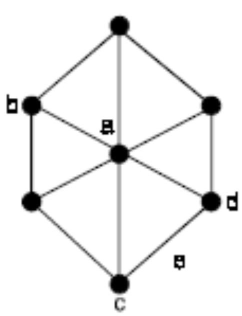
In all, G and G' are isomorphic

Problem 3. *For the graph G shown below, draw the subgraphs*

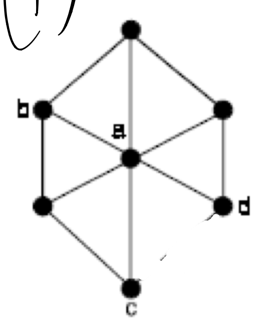
(i) $G - e$

(ii) $G - a$

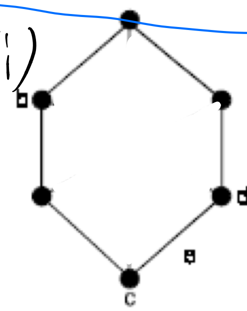
(iii) $G - b$.



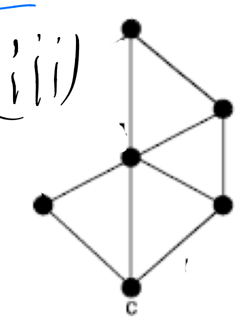
(i)



(ii)



(iii)



Problem 4. *Consider the following directed graph G :*

$V(G) = \{a, b, c, d, e, f, g\}$

$E(G) = \{(a, a), (b, e), (a, e), (e, b), (g, c), (a, e), (d, f), (d, b), (g, g)\}$.

(i) Identify any loops or parallel edges. (a,a) and (g,g) are loops (a,e) and (a,e) are parallel edges

(ii) Are there any sources in G ? d

(iii) Are there any sinks in G ? f and c

(iv) Find the subgraph H of G determined by the vertex set $V = \{a, b, c, d\}$.

V={a,b,c,d} E={(a,a),(d,b)} H=H(V,E)

Problem 5. *Does a 3-regular graph on 14 vertices exist? What can you say on 17 vertices?*

$q=(p\times r)/2$

$r=3$, $p=14$

$q=(14\times 3)/2=21$

3-regular graphs on 14 vertices exit

if $p=17$, then $q=(17\times 3)/2=51/2$ isn't a positive integer

Hence no 3-regular graphs on 17 vertices exist