MATH 151

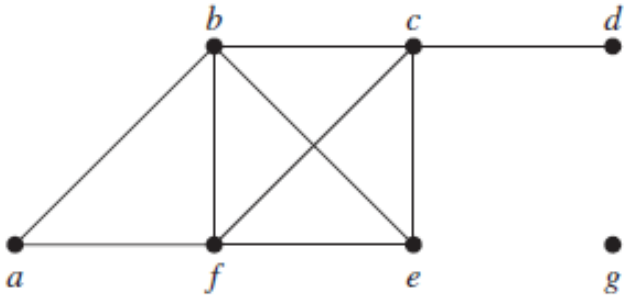
Graph

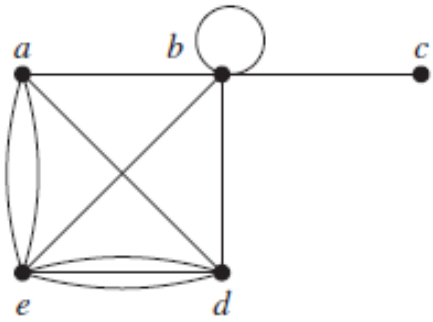
Lecture 8

By Khaled A Tanash

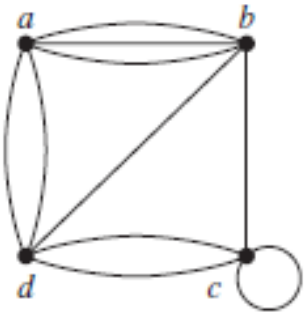
ktanash@ksu.edu.sa

Exercise 1: Find the degree of each vertices of following graph so find the sequence degree

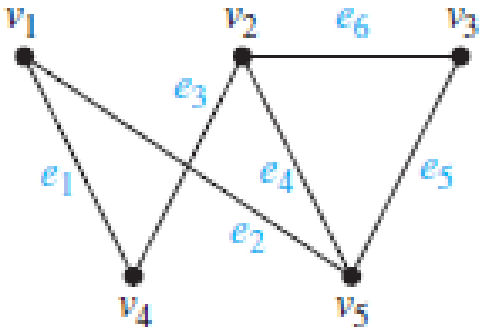




Exercise 2: Represent the graph by adjacency matrix

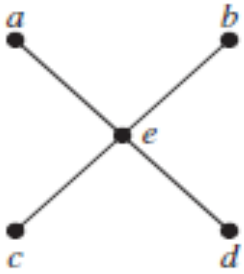


Exercise 3: Represent the graph by incidence matrix



Exercise 4: Determine whether the graph is bipartite. If so provide a bipartite graph representation.

i.



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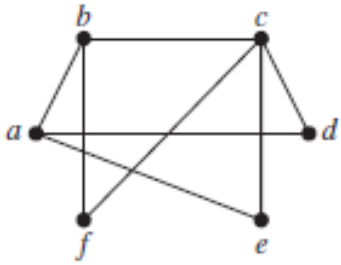

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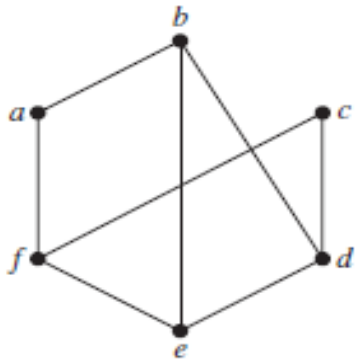

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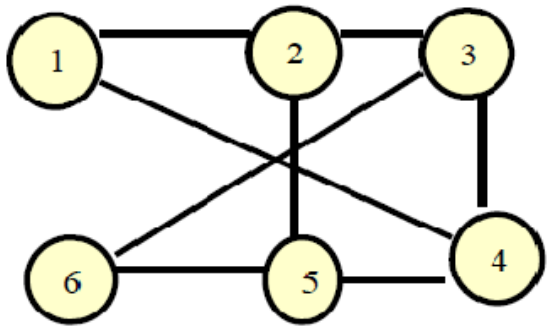

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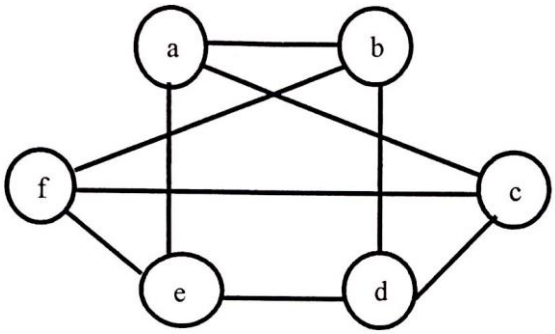

Exercise 5: Let G be the simple graph represented by the adjacency matrix A below.

i. Draw the graph G

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

ii. Determine whether the graph is bipartite. If so, provide a bipartite representation.

Exercise 6: Let G be a graph such that $V = \{a,b,c\}$ and $\deg(b) = 2\deg(a)$ $\deg(c) = 3\deg(a)$ where $|E| = 9$. Find $\deg(a)$

Exercise 7: Let G be a graph such that $V = \{a,b,c,d,f\}$ and $\deg(a) = \deg(b) = \deg(c) = \deg(d) = 1$ where $|E| = 4$. Find $\deg(f)$

Exercise 8: Is there a graph has degree sequence $0,1,1,2,3,4,5,5$. why?

Exercise 9: Is there a simple graph has degree sequence $1,2,3,3,5,6$. why?

Exercise 10: Let G be a graph has degree-sequence $n,n,n,n,2n,2n,3n$ and $E(G)=11$. Find n

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Exercise 11: If G is a graph with 9 edges and the degree-sequence $1,3,x,x$ Find x

Exercise 12: Let G be a graph with degree-sequence $1,a,a,a^2$ knowing that G has 8 edges, find all possible value of a.

Exercise 13: Determine the number of edges for the complement of $K_{10,14}$

Exercise 14: Find the number of edges of complement $K_{4,7}$

Exercise 15: Find the number n of vertices of complete graph having $10n$ edges.

Exercise 16: Find the number of vertices of complete graph have 55 edges

Exercise 17: If $K_{5,n}$ having the same number of edges of K_n . Find the value of n .

Exercise 18: If the number of vertices equal number of edges in $K_{n,n}$ find n

Exercise 19: If you know the number of vertices of K_{m,m^2} is 42. Find the number of edges

Exercise 20: Let G be a graph represented by incidence matrix

Find $|E(G)|$ and $|E(\bar{G})|$

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

Exercise 21: Represent $\bar{K}_{2,3}$. Then determine whether $\bar{K}_{2,3}$ is bipartite graph or not

Exercise 22: There is a graph has 8 vertices and 18 edges regular. why?

Exercise 23: If the number of edges of K_n is $4n$. Find n

Exercise 24: If G be a graph with $3n$ vertices, such that n vertices have degree 2 and $2n$ vertices have degree 1. Find n if you know $E(G) = 20$

Exercise 25: If G is a complete graph with 21 edges. How many vertices dose G have?

Exercise 26: If G is a complete graph with 45 edges. How many vertices dose G have?

Exercise 27: If G is a simple graph with 15 edges and $\bar{G}$ has 13 edges. How many vertices dose G have?

Exercise 28: If G is a simple graph with n vertices and 30 edges and $\bar{G}$ has 36 edges. How many vertices dose G have?

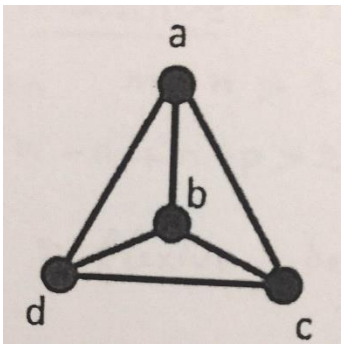
Exercise 29: If G is a 4-reguler graph with 8 vertices. Find the number of edges for its complement $\bar{G}$.

Exercise 30: Find all possible numbers of vertices of complete bipartite graphs $K_{m,n}$ having 12 edges.

Exercise 31: Given an example of complete graph which is not complete bipartite.

Exercise 32: Given an example of complete bipartite graph which is not complete.

Exercise 33: For the graph below:

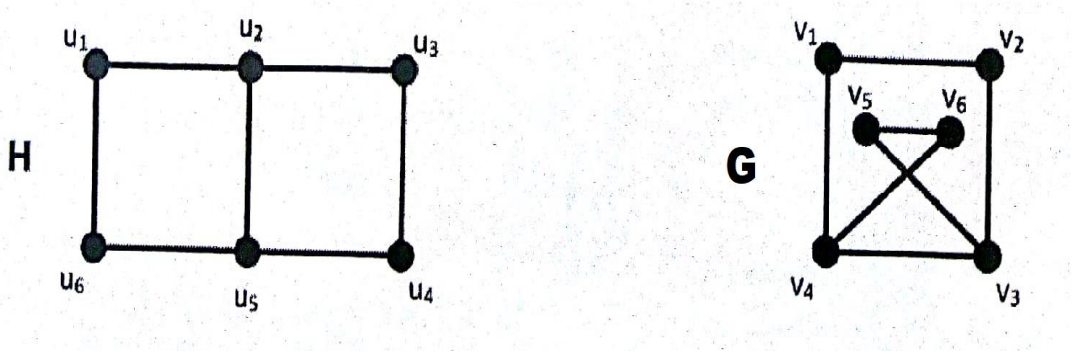


i. Find the adjacency matrix A with respect to the ordering of vertices a, b, c, d

ii. Use the matrix A to find the number of paths of length 3 between a and b

Exercise 34: Determine whether the following graphs H and G are isomorphic

i.



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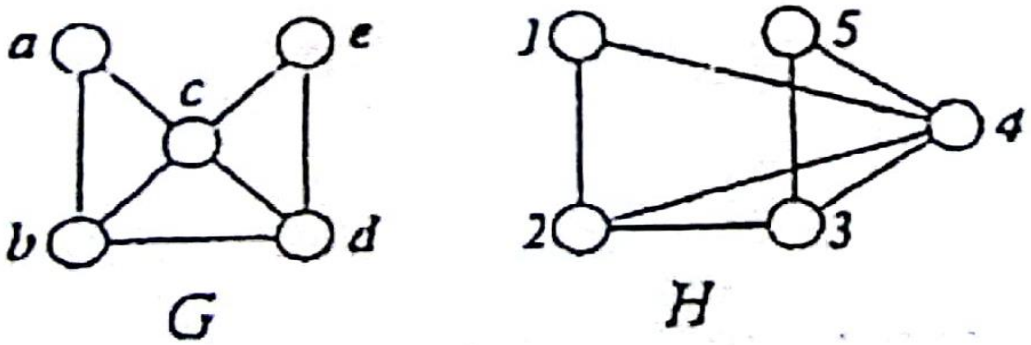

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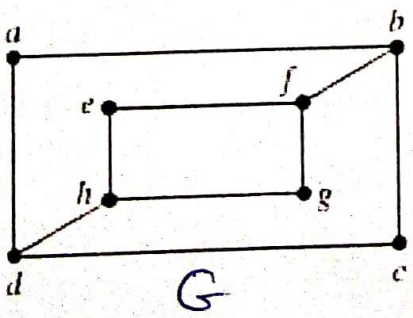

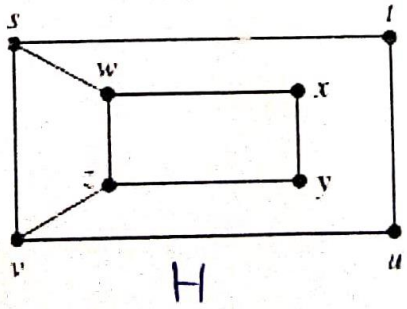

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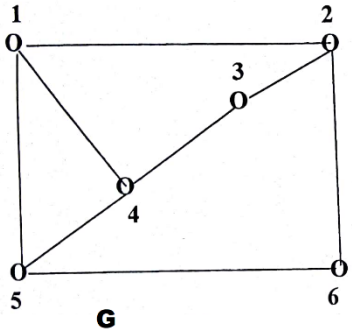

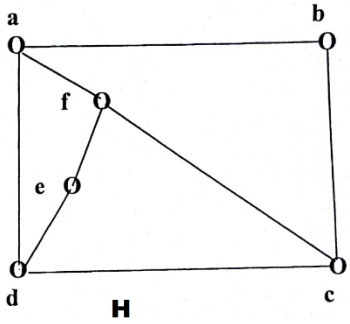

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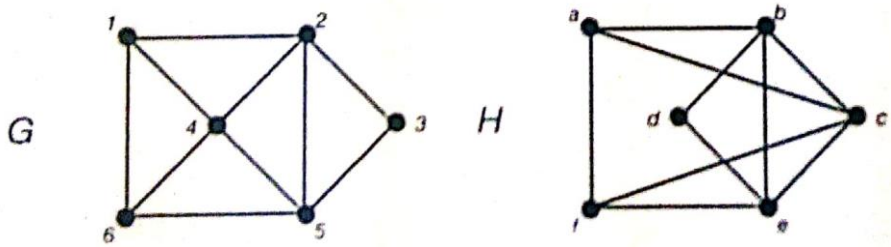

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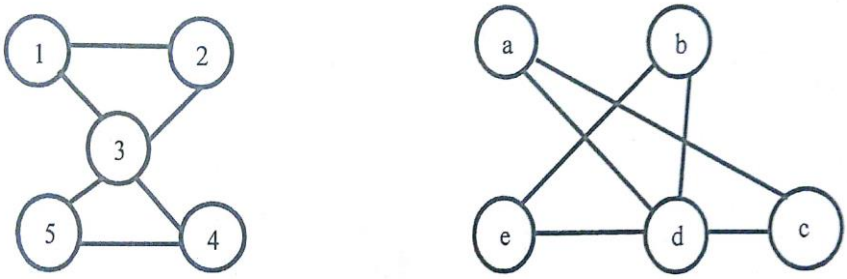
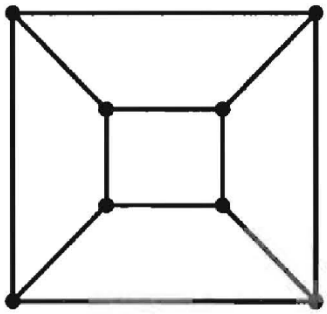
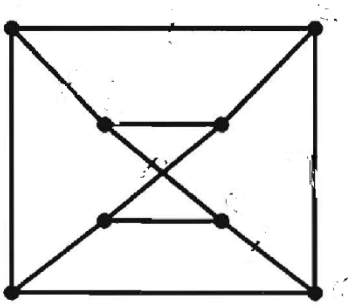


vii.

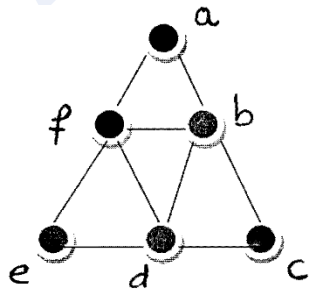


G



H

viii.



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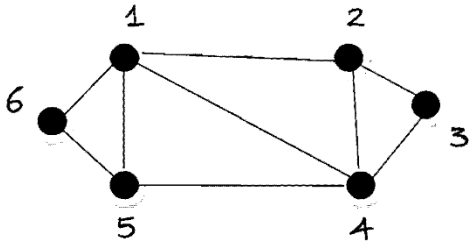

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