الفرقة: المستوي الرابع معتمد
الشعبة: برنامج الرياضيات
المادة: نظرية الرسومات(٤٠٤ر)

# Final term Exam
# January 2022

جامعة دمياط
Damietta University

**Date: 16 / 1/ 2023** **Time: 2 hours** **Mark:70**

**DamiettaUniversity**
**Faculty of Science**
**Mathematics Department**

## Answer the following questions:

### Question One: [20mark]

1-Draw a connected simple graph with the following degree of vertices or explain why no such graph exists :

(i) 3 , 3 , 2 , 2 , 2 , 1 .

(ii) 6 , 6 , 6 , 4 , 4 , 3 , 3 .

2 -Find two graphs that have the same degrees of vertices , but are not isomorphic .

3- Draw the graph whose adjacency matrix is given ,and state wether the graph is simple graph or regular graph or both .

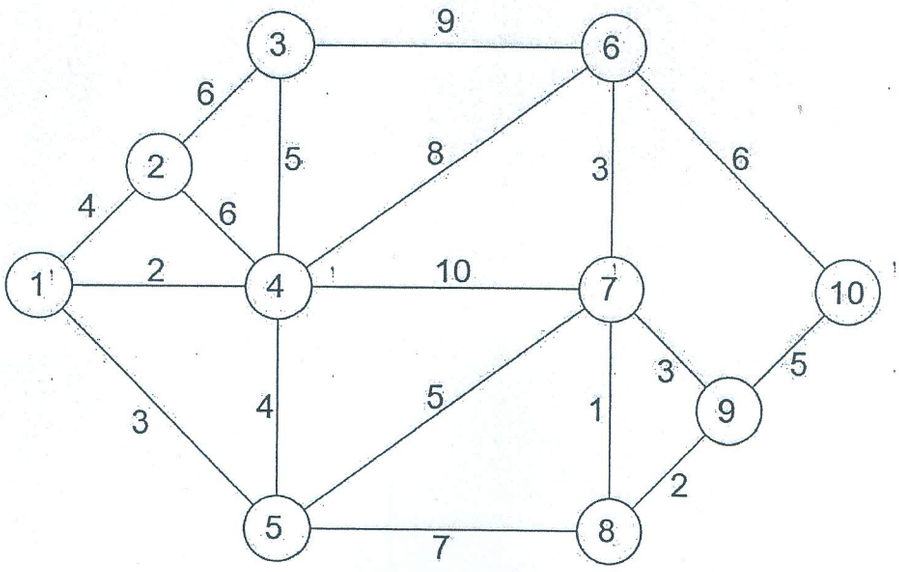
$$A=\begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

### Question two: [16mark]

1- Consider a simple graph $G$ , where $E(G)$ denotes the edges and $V(G)$ denotes the vertices such that : $|E(G)|=12$ , $|V(G)|=8$ .Find the number of edges $|E(G^c)|$ in Complement graph $(G^c)$ .

2- How many edges has each of the following graphs: $(i)$ $k_{10}$ $(ii)$ $k_{5,7}$

3-Find an optimal ( minimal ) spanning tree for the following graph :

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**Question Three :** [*20 marks*]

1- Put(√) in front of the correct statement and Put(×) in front of the wrong statement:

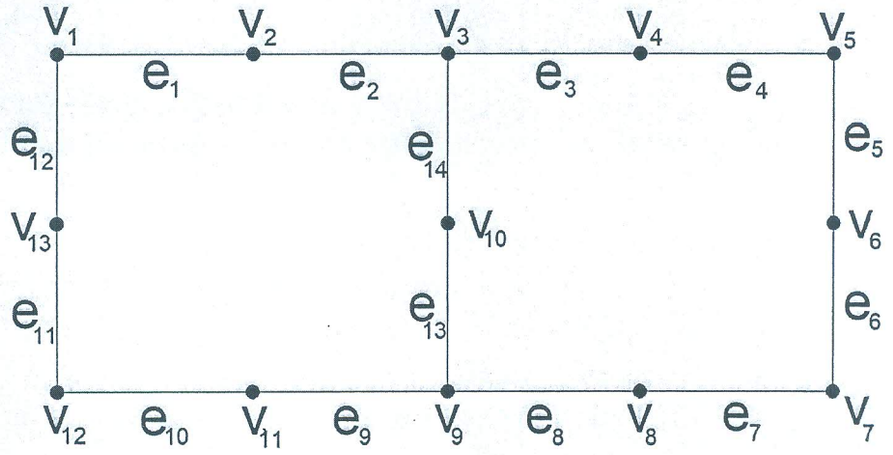
a) The graph $k_{3,3}$ is nonplanar graph but $(k_{3,3} - e)$ is planar where e any edge of $k_{3,3}$

b) Every connected simple graph has at least two vertices of equal degree

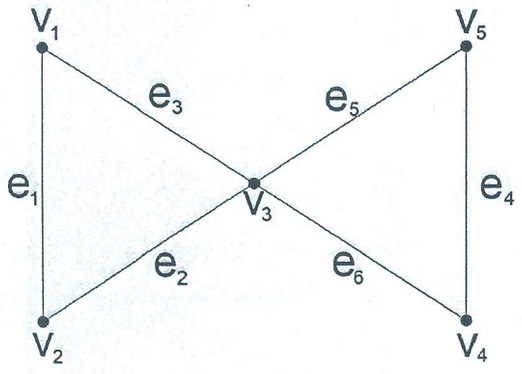
c) $k_5 - e$ is planar for any edge $e$ of $k_5$

d) A connected graph is a tree if and only if it has some edges that bridges

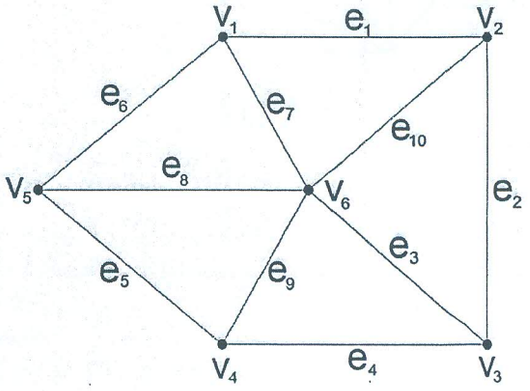
2- What is the type of each of the following graphs (Eulerian – semi- Eulerian – Hamiltonian ) , then find an Eulerian circuit - Eulerian trails – Hamiltonian cycle according to the type of each graph in order .




G 1




G 2

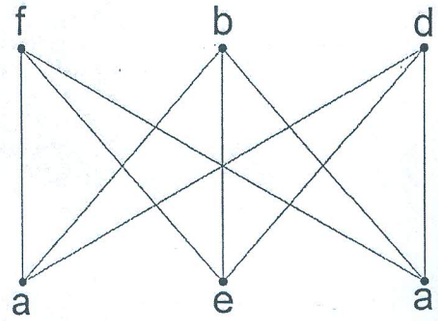


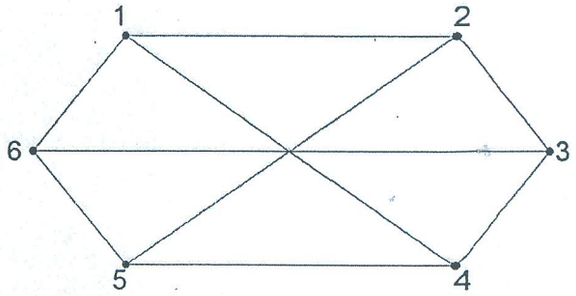

G 3

**Question Four :** [*14 marks*]

1-Which of the following pairs of graphs are isomorphic ?

(I)

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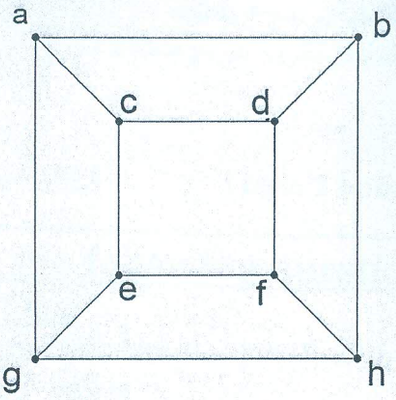
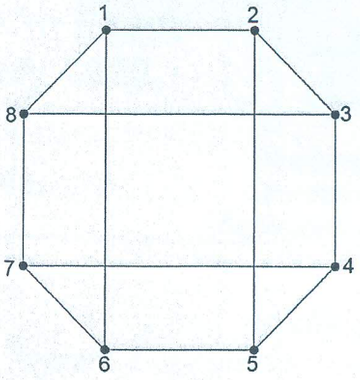
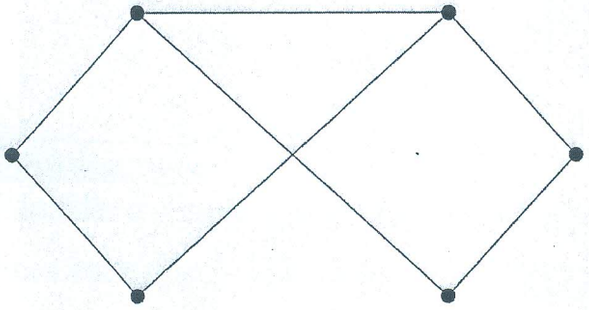
(II)

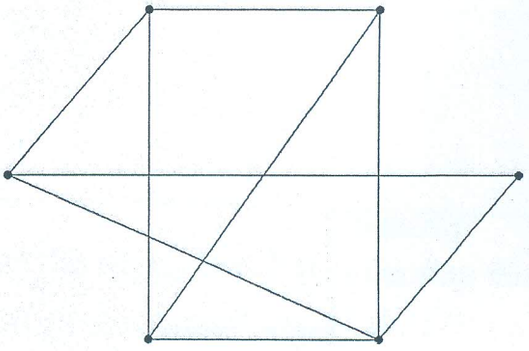



2-Show that which the graph of the following:
Is it planar ? Is it bipartite ? Explain your answers by drawing the graphs.



G 1



G 2

*With Best Wishes*
*Dr. Y.M.Younes*
*Head of Mathematics Department: Prof. Dr. A. M. Tarabia*