Q1 → Which one of the following is TRUE for any simple connected undirected graph with more than 2 vertices ?

(a) No two vertices have the same degree

(b) Atleast two vertices have the same degree

(c) Atleast three vertices have the same degree

(d) All the vertices have the same degree.

Q2 → Which of the following statements is/are True for undirected graphs?

P: Number of odd degree vertices is even.

Q: Sum of degrees of all vertices is even

(a) P only
(b) Q only
(c) Both P and Q
(d) Neither P nor Q

Q3→ What is the number of vertices in an Undirected Connected graph with 27 edges, 6 vertices of degree 2, 3 vertices of degree 4 and remaining of degree 3 ?

a) 10

b) 11

c) 18

d) 19

Q4 A simple non-directed graph G has 24 edges and degree of each vertex is k, then which of the following is possible number of vertices ?

a) 20

b) 15

c) 10

d) 8

Q5 Maximum number of vertices possible in a simple non-directed graph with 35 edges and degree of each vertex is atleast 3 is _____

Q6 Minimum number of edges necessary in simple non-directed graph with 25 vertices and degree of each vertex is atleast 4 is ____.

Q7 Minimum number of ~~edges~~ Vertices necessary in a simple non-directed graph with 13 edges and degree of each vertex is atmost 3 is ____.

Q8 G is an undirected graph with n vertices and 25 edges such that each vertex of G has degree atleast 3. Then the maximum possible value of n is _____.

Q9

An ordered n-tuple $(d_1, d_2, \ldots d_n)$ with $d_1 \geq d_2 \geq \ldots \geq d_n$ is called graphic if there exists a simple undirected graph with n vertices having degrees $d_1, d_2, \ldots d_n$ respectively. Which of the following 6-tuples is NOT graphic ?

(a) $(1, 1, 1, 1, 1, 1)$

(b) $(2, 2, 2, 2, 2, 2)$

(c) $(3, 3, 3, 1, 0, 0)$

(d) $(3, 2, 1, 1, 1, 0)$

Q10

The degree sequence of a simple graph is the sequence of the degrees of the nodes in the graph in decreasing order. Which of the following sequences cannot be degree sequence of any graph ?

I. 7, 6, 5, 4, 4, 3, 2, 1

II. 6, 6, 6, 6, 3, 3, 2, 2

III. 7, 6, 6, 4, 4, 3, 2, 2

IV. 8, 7, 7, 6, 4, 2, 1, 1

(a) I and II

(b) III and IV

(c) IV only

(d) II and IV

Q11- Maximum number of edges in a n-node undirected graph without self loops is

(a) n^2

(b) $\frac{n(n-1)}{2}$

(c) $n-1$

(d) $\frac{(n+1)(n)}{2}$

Q12

How many undirected (not necessarily connected) can be constructed out of a given set $V = \{v_1, v_2, \ldots v_n\}$ of n vertices ?

(a) $\frac{n(n-1)}{2}$

(b) 2^n

(c) $n!$

(d) $2^{n(n-1)/2}$

Q13

How many graphs on n labeled vertices exist which have atleast $\frac{n^2-3n}{2}$ edges ?

(a) ~~n^2-3n~~ $\frac{n^2-n}{2}$ $C_{(n^2-3n)/2}$

(b) $\sum_{K=0}^{(n^2-3n)/2} {}^{(n^2-n)/2}C_K$

(c) ${}^{(n^2-n)/2}C_n$

(d) $\sum_{K=0}^{n} {}^{(n^2-n)/2}C_K$

Q14

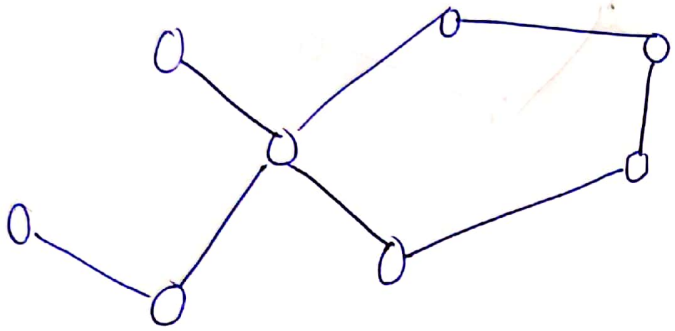
Number of Edges in a regular graph of degree d and n vertices is _____

Q15

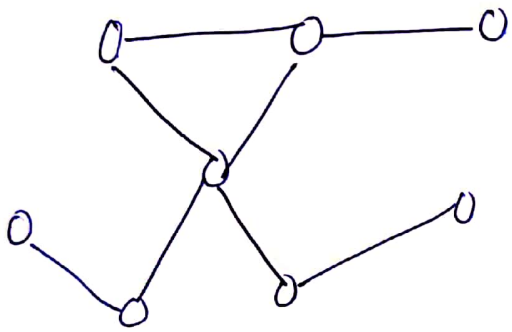
Maximum number of edges in a bipartite graph on 12 vertices is _____.

Q16

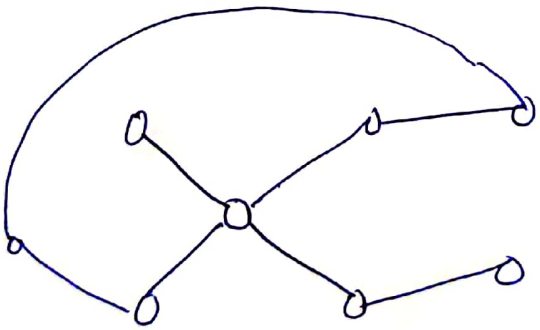
Which of the following graphs is isomorphic to



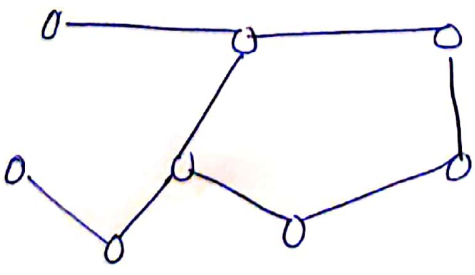
(a)



(b)



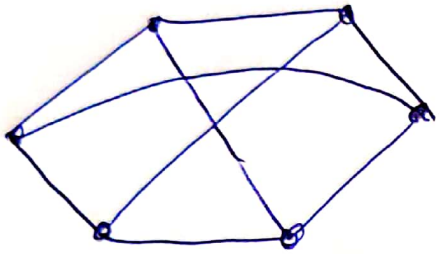
(c)



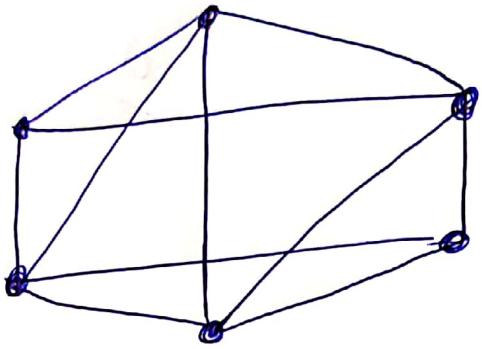
Q17

A cycle on n vertices is isomorphic to its complement. The value of n is _____.

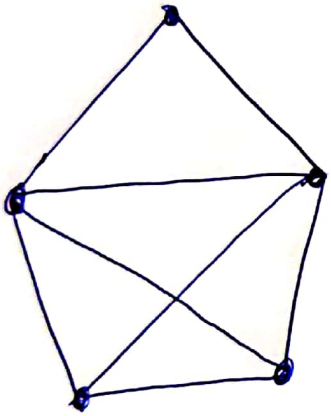
Q18 Which of the following graphs is NOT planar ?



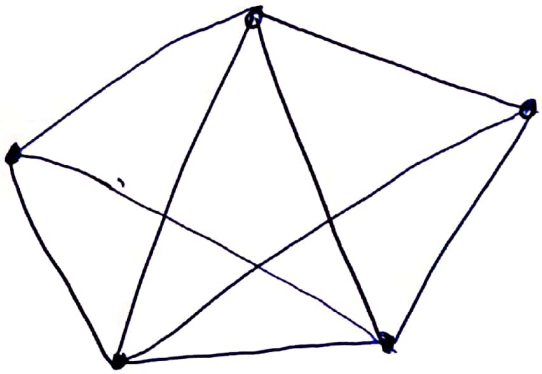
G1



G2



G3

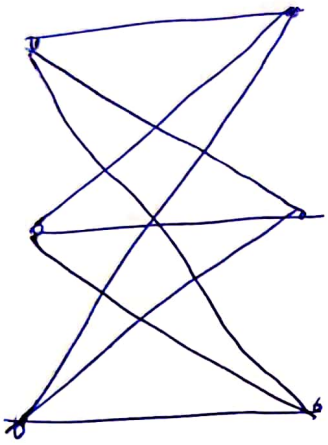


G4

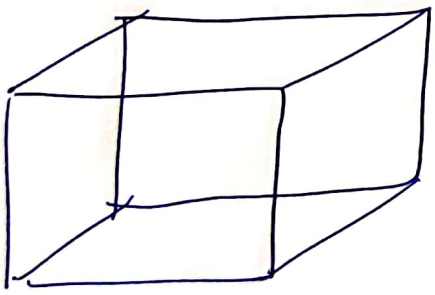
(a) G1
(b) G2
(c) G3
(d) G4

Q19

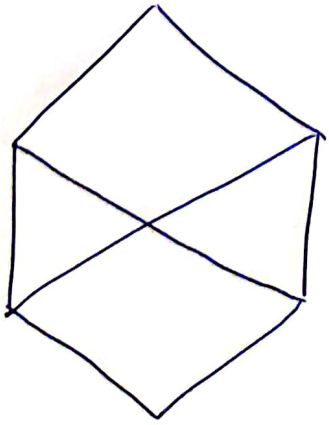
Which of the following graphs is/are planar ?



G1



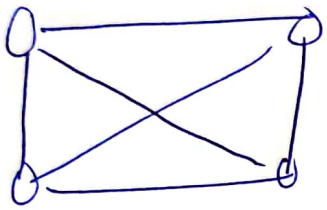
G2



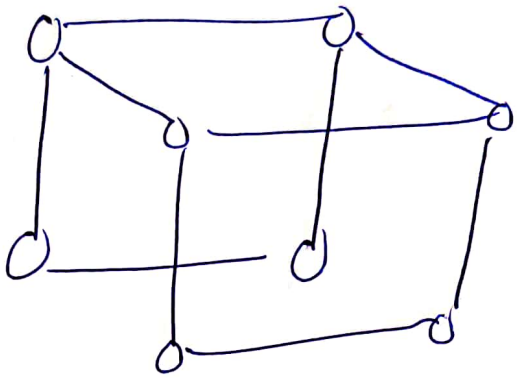
G3

Q20

K_4 and Q_3 are graphs with the following structures.



K_4



Q_3

Which one of the following statements is TRUE in relation to these graphs ?

(a) K_4 is ~~not~~ planar while Q_3 is not

(b) Both K_4 and Q_3 are planar

(c) Q_3 is planar while K_3 is not

(d) Neither K_4 nor Q_3 is planar.

Q 21

Let G be a simple connected planar graph with 13 vertices and 19 edges. Then, the number of faces in the planar embedding of the graph is:

(a) 6

(b) 8

(c) 9

(d) 13

Q22

Let G be a simple undirected planar graph on 10 vertices and 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to

(a) 3

(b) 4

(c) 5

(d) 6

Q23

Let G be a connected planar graph with 10 vertices. If the number of Edges on each face is three, then the number of edges in G is _____

Q24 Let G be the non-planar graph with minimum possible number of edges. Then G has

a) 9 edges and 5 vertices

b) 9 edges and 6 vertices

c) 10 edges and 5 vertices

d) 10 edges and 6 vertices

Q25

Q - A non-planar graph with minimum number of vertices has

a) 9 edges, 6 vertices

b) 6 edges, 4 vertices

c) 10 edges, 5 vertices

d) 9 edges, 5 vertices

Q26

A graph is planar if and only if,

(a) it does not contain subgraphs homeomorphic to K_5 and $K_{3,3}$.

(b) It does not contain subgraphs isomorphic to K_5 and $K_{3,3}$.

(c) It does not contain subgraphs ~~to~~ isomorphic to K_5 and $K_{3,3}$.

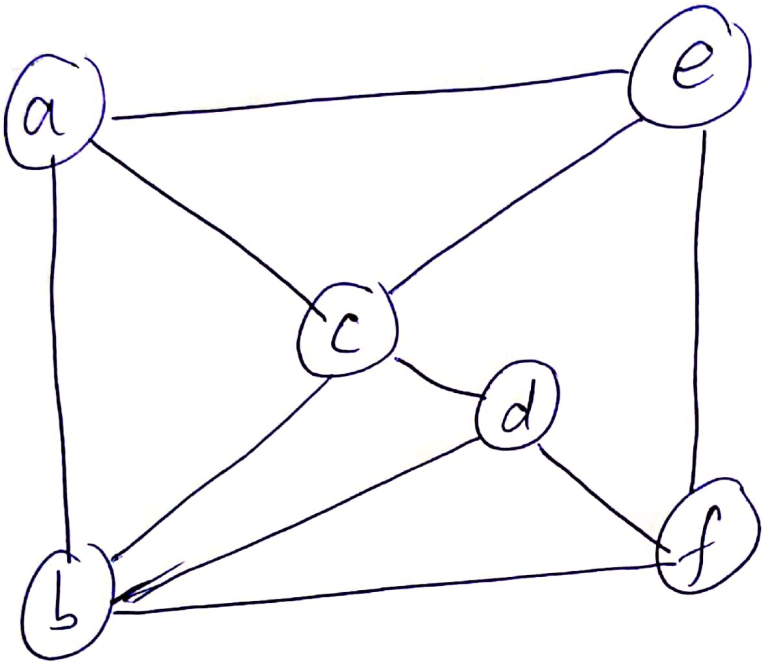
(d) It does not contain subgraphs homeomorphic to K_5 and $K_{3,3}$.

Q27

Minimum number of colours that is sufficient to Vertex-colour any planar graph is ____.

Q28

The chromatic number of the following graph is _____



Q29

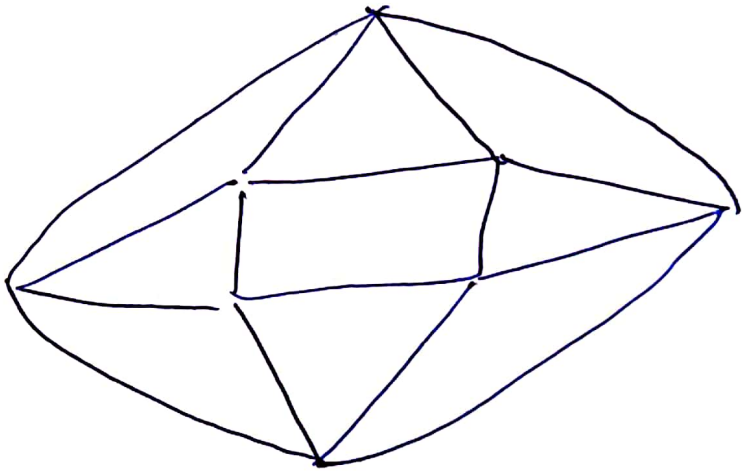
Minimum number of colours required to colour the following graph, such that no two adjacent vertices are assigned the same colour is

(a) 2

(b) 3

(c) 4

(d) 5



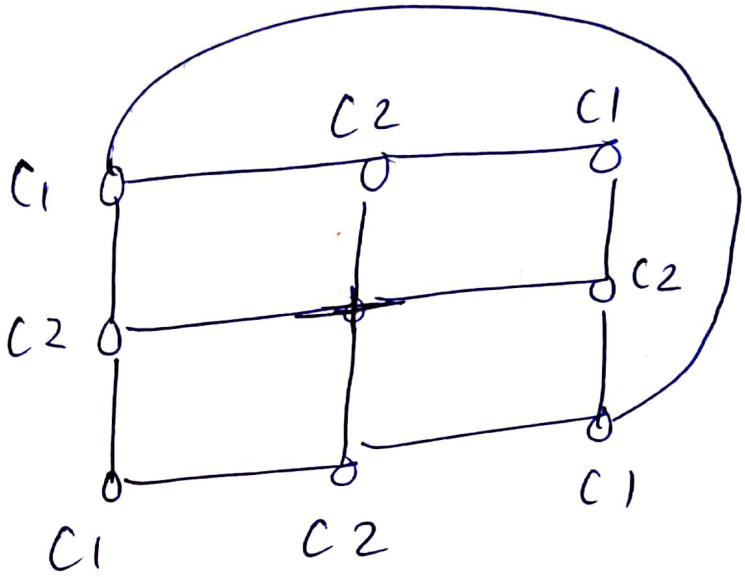
Q30 What is the chromatic number of the following graph ?

(a) 2

(b) 3

(c) 4

(d) 5



Q31

Maximum number of Edges in a planar graph with n vertices is _____

a) $3n - 6$

b) $3n - 4$

c) $3n - 12$

d) $3n - 8$

Q32

A graph $G = (V, E)$ satisfies $|E| \leq 3|V| - 6$. The min-degree of G is defined as $\min_{v \in V} \{\text{degree}(v)\}$. Therefore, min-degree of G cannot be

(a) 3

(b) 4

(c) 5

(d) 6

Q33

What is the chromatic number of an n-vertex simple connected graph which does not contain any odd length cycle? Assume $n \geq 2$.

(a) 2

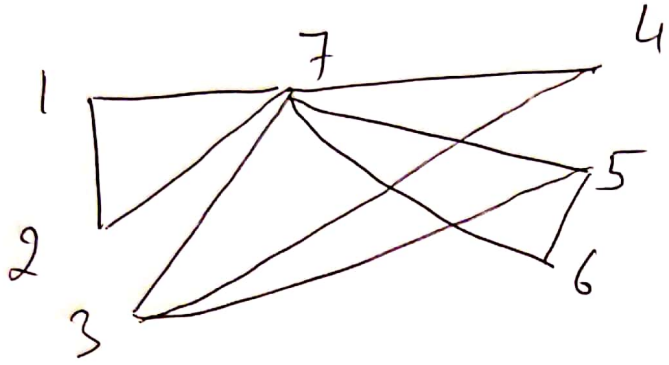
(b) 3

(c) $n-1$

(d) n

Q34

Which of the following is not maximal matching



a) {1-2, 5-6, 3-4}

b) {3-4, 5-7, 1-2}

c) {1-7, 5-6}

d) {7-2, 3-5}

Q35

The number of Complete matching for $K_{n,n}$ is

a) $n!$

b) n^n

c) 2^n

d) n^2

Q36

Number of perfect matching possible for K_{2n} is

a) $(2n)!$

b) $\frac{(2n)!}{2^n}$

c) $\frac{(2n)!}{2^n \cdot n!}$

d) $\frac{(2n)!}{n!}$

Q37

How many perfect matching are there in a complete graph of 6 Vertices ?

a) 15

b) 24

c) 30

d) 60

Q38

The number of perfect matchings possible for C_{2n} (cycle graph with even number of vertices) ?

a) 1

b) 2

c) n

d) $n!$