Lecture 25

19 October 2021 10:06

How many edges are there in K_n?

n vertices, each vertex is connected with $(n-1)$

Sum of degrees $= n(n-1) = 2(\text{Edges})$

Edges in $K_n = \frac{n(n-1)}{2}$

K_8, no of edges $= \frac{8(8-1)}{2} = 28$ //

Q9. How many vertices does a regular graph of degree 4 with 10 edges have?

(A) 20 (B) 10 (C) 5 (D) 15

4-regular, edges $= 10$, $n = ?$

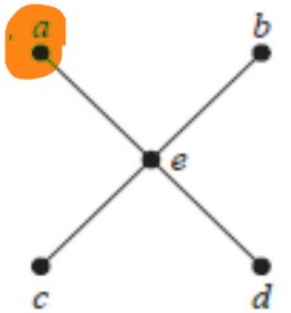
$$\sum \text{degree} = \sum_{n} 4 = 2(10)$$

$$4n = 20$$

$$n = 5$$

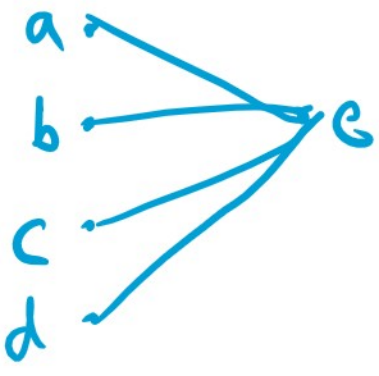
Bipartite Graph: A simple graph G is called bipartite if its vertex set V can be partitioned into two disjoint sets V_1 and V_2 such that every edge in the graph connects a vertex in V_1 and a vertex in V_2 and no edge in G connects either two vertices in V_1 or two vertices in V_2.

The pair (V_1, V_2) is called a bipartition of V of G.



V_1: a, b, c, d

V_2: e

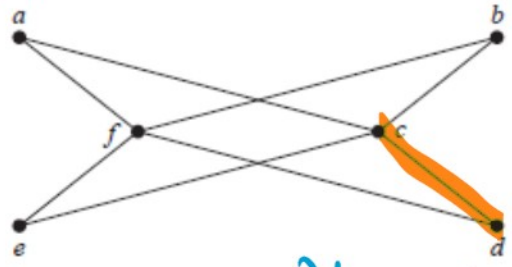


Q10. Check whether the following graph is bipartite.

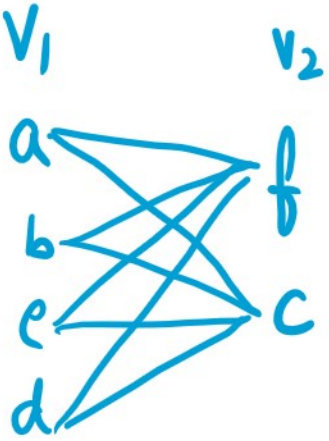
d a

Q10. Check whether the following graph is bipartite.

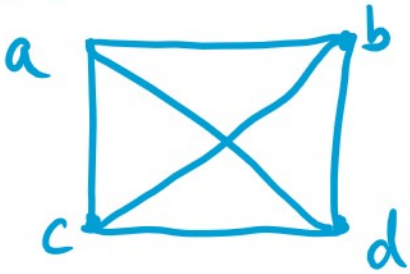
(a)



Yes Bipartite



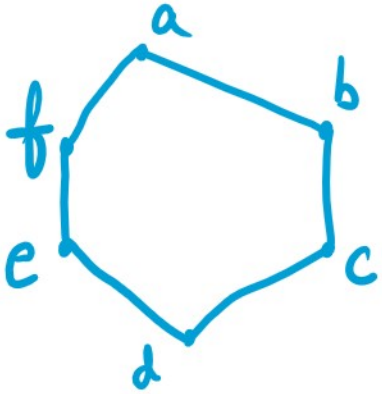
(b) K_4

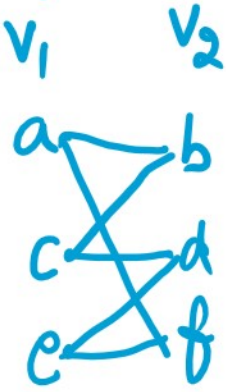


K_n is not Bipartite for $n > 2$

K_2 is bipartite.

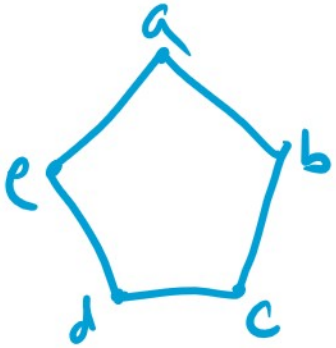
(c) C_6





Bipartite

C_5

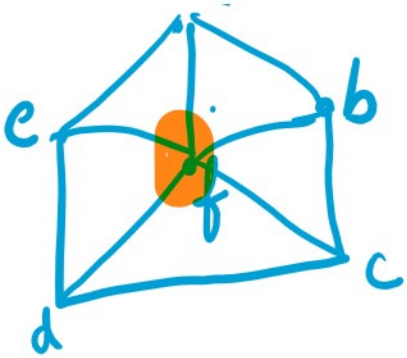


Not Bipartite

C_n will be bipartite for even values of n.

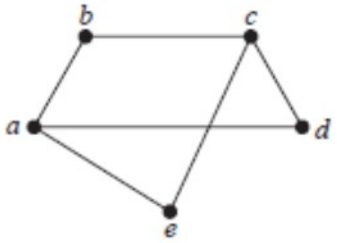
(d) W_5

(d) W_5

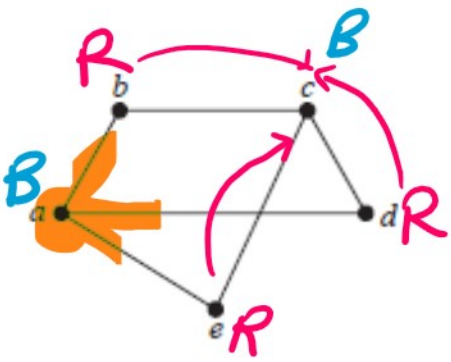


No Bipartite for any n.

(e)



Theorem 4: A simple graph is bipartite graph if and only if it is possible to assign one of two different colours to each vertex of the graph so that no two adjacent vertices are assigned with the same colour.

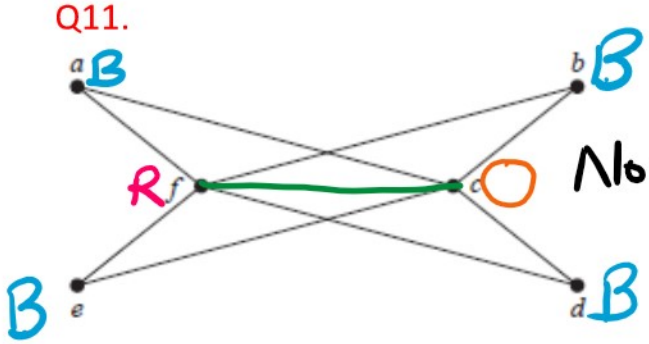


V_1: a, c

V_2: b, d, e

Yes Bipartite

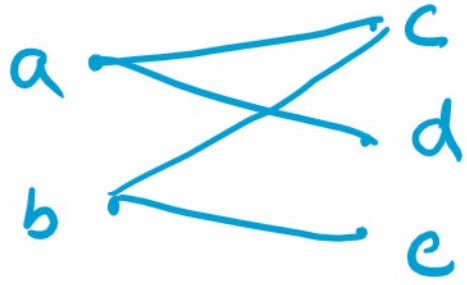
Q11.



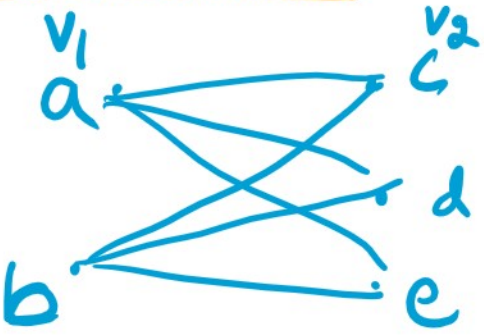
Not Bipartite

Complete Bipartite Graph: It is a graph that has its vertex set partitioned into two subsets of m and n vertices, respectively with an edge between two vertices if and

Complete Bipartite Graph: It is a graph that has its vertex set partitioned into two subsets of m and n vertices, respectively with an edge between two vertices if and only if one vertex in the first subset and the other vertex in the second subset. It is denoted as $K_{m,n}$.



Bipartite



Complete Bipartite

$K_{m,n}$ no. of vertices $= m+n$

no of edges $= mn$

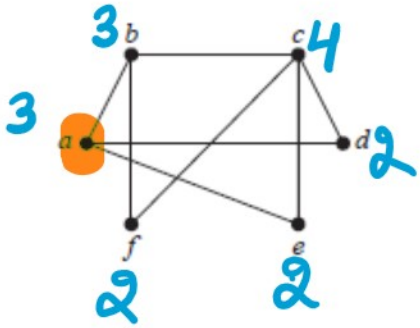
degree of vertex in $V_1 = n$

degree of vertex in $V_2 = m$

K_2 

$K_{1,1}$

Degree sequence of a graph is the sequence of the degrees of the vertices of the graph in non-increasing order.



4, 3, 3, 2, 2, 2

Q12. How many edges does a graph have if its degree sequence is 4, 3, 3, 2, 2? Draw such a graph.

4, 3, 3, 2, 2

$\sum \text{degree} = 2(E)$

* Odd degrees → Even ✓

A degree sequence is called graphic if it is the degree sequence of a simple graph.