T21 G1 08 April 2022

08 April 2022 11:06

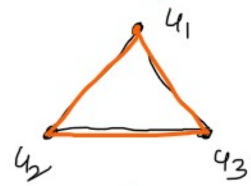
3) Complete graph :→

A graph is s.t.b Complete graph if there exists an edge b/w every pair of its vertices or every pair of vertices are adjacent to each other.

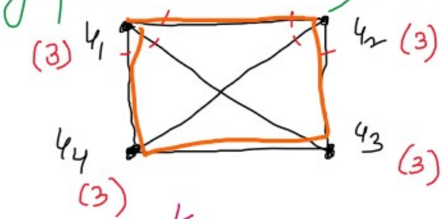
It is denoted by K_n (Complete graph with n vertices)

K_1

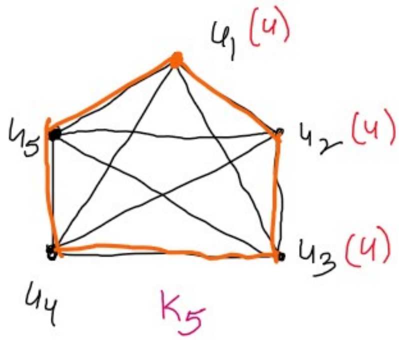
K_2



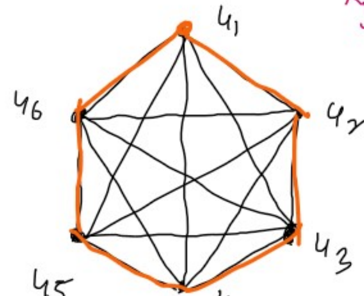
K_3



K_4



K_5



K_6

In K_n

① the no. of vertices $= n$

② the degree of every vertex $= (n-1)$

③ the no. of edges $= \frac{n(n-1)}{2}$

By Handshaking $\sum \deg(v) = 2e$

sum of degree of all the vertices $= n(n-1) = 2e$

$\Rightarrow \boxed{e = \frac{n(n-1)}{2}}$

The no. of edges in K_{10} is

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$$\frac{\cancel{10}^{5}(10-1)}{2} = 5\times 9 = \underline{\underline{45}}$$

\# For what value of n, K_n contains an Euler circuit? $\rightarrow \deg(v) = \text{even}$

(a) All (b) Even (c) odd (d) No value

In K_n $\deg(v) = n-1 = \text{even}$

$\Rightarrow \boxed{n = \text{odd}}$

\# For what value of n, K_n contains an Hamiltonian path

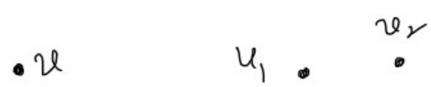
(a) All (b) Even (c) odd (d) No value

\# For what value of n, K_n contains Hamiltonian circuit.

$\boxed{\text{All except } n=2}$

④ **Regular Graph** :→ A graph is said to be regular if degree of every vertex is same.

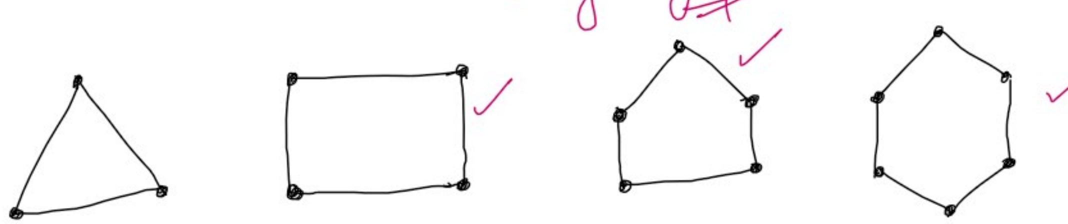
If $\deg(v) = K$, $v \in V$ then the graph is $\underline{K\text{-regular graph}}$



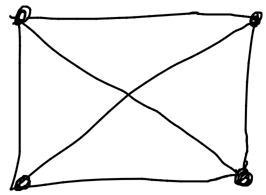
0-regular graph

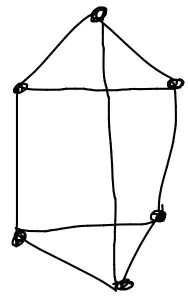
1-Regular graph

2-regular graph



3-regular graph





All complete graphs are regular

K_n is $(n-1)$ regular graph

but

not all regular graphs are complete

Draw a 3-regular graph with 3 vertices?

Not possible

$$\sum \deg(v) = 2e$$

$$3(3) = 2e$$

$$\Rightarrow e = 9/2$$

Find the no. of vertices in a 4-regular graph with 20 edges

$$\sum \deg(v) = 2e$$

Let

no. of vertices $= n$

$$4n = 2(20)$$

$$4n = 40$$

$$n = 10$$

The degree sequence of K_8 is

7, 7, 7, 7, 7, 7, 7, 7