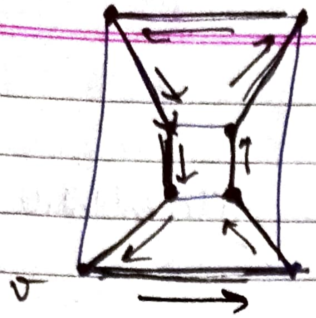
HAMILTONIAN GRAPHS :-

→ Hamiltonian Circuit :- A Hamiltonian ~~eur~~ circuit in graph is a closed path that visits every vertex in the graph exactly once. (Such a closed loop must be a cycle.)

→ A Hamiltonian circuit ends up at the vertex from where it started

→ This type of problem is often referred to as the traveling salesman or postman problem.

→ Hamiltonian Graph :- If a graph has a Hamiltonian circuit, then the graph is called a Hamiltonian graph.



Dodecahedron.

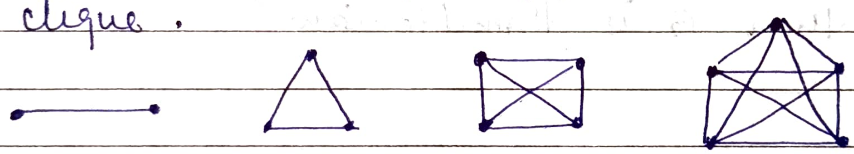
The length of a Hamiltonian path (if it exists) in a connected graph of n vertices is $n-1$

It can not ~~incude~~ include parallel edges or self loop.

What general class of graphs is guaranteed to have a Hamiltonian circuit?

Complete Graphs of three or more vertices consitute one such class.

→ Complete Graphs :- A graph G is said to be complete if every vertex in G is connected to every other vertex in G. Therefore, a complete graph G must be a connected graph. Sometimes ~~suppre~~ referred to as universal graph or a clique.



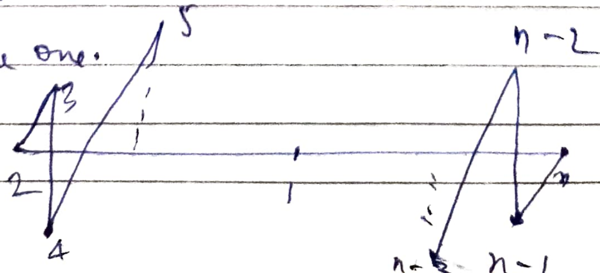
→ Every vertex of a complete graph of n vertices has $(n-1)$ degree.

→ Every complete graph is a regular

→ The total no. of edges in G is $\frac{1}{2}n(n-1)$.

Theorem :- In a complete graph with n vertices there are $(n-1)/2$ edge-disjoint Hamiltonian circuits, if n is an odd no ≥ 3.

→ $(n-3)/2$ new Hamiltonian circuits, all edge disjoint from the one.



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Walk

- open Walk
  - path → Hamiltonian path
  - Unicrusal lin
- Closed Walk
  - circuit → Hamiltonian circuit
  - Eulerlin → Arbitrarily traceable.

Dirac's Theorem →

Let G be a simple graph with n vertices where $n \geq 3$. If $\deg(v) \geq \frac{n}{2}$ for each vertex v, then G is Hamiltonian.

Ore's Theorem →

Let G be a simple graph with n vertices where $n \geq 2$ if $\deg(v) + \deg(w) \geq n$ for each pair of non adjacent vertices v & w, then G is Hamiltonian.

eg— Gray Code, TSP, Hamiltonian