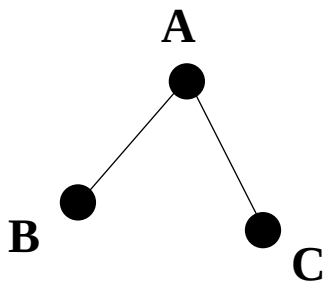
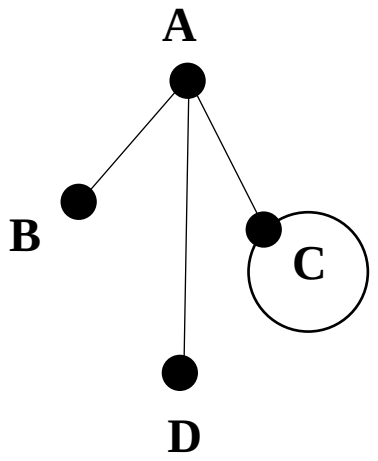
Graph Theory:

A graph consists of a set of points called the vertices, and a set of segments or curves called the edges that connect one vertex to another. An edge that connects a vertex to itself is called a loop.

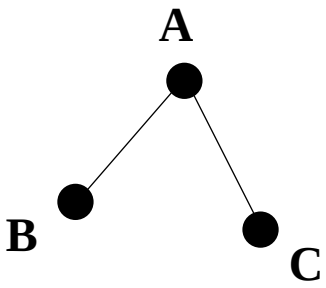
Examples:

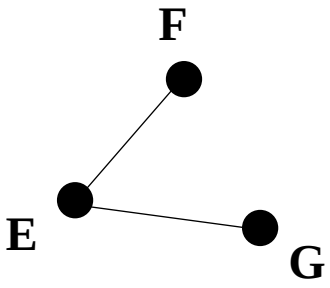




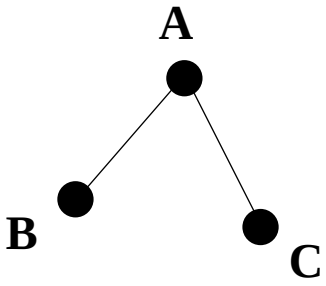
Equivalent Graphs:

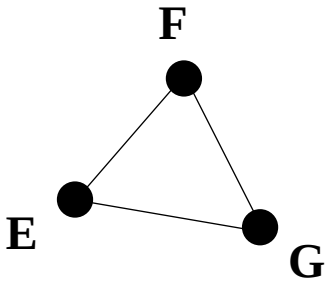
Two graphs are equivalent if they have the same number of vertices connected in the same way.





This graph is equivalent to the graph on the left because it has the same number of vertices connected in the same way.





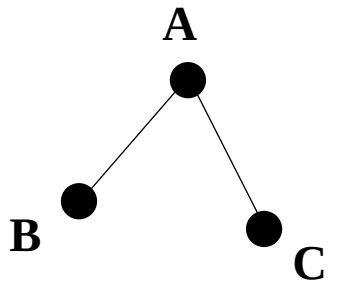
This graph is not equivalent to the graph on the left. Although it has the same number of vertices, they are connected differently.

Degree of a Vertex:

It's the number of edges at the vertex. Loops count as 2 edges at a vertex.

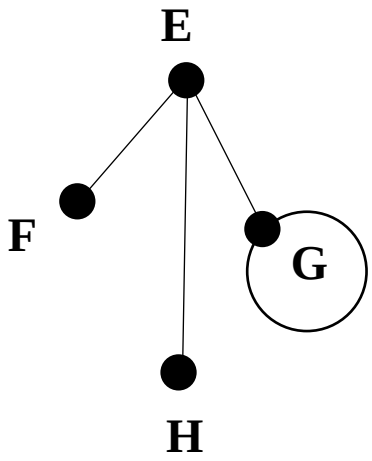
Examples:

Vertex	Degree
A	2
B	1
C	1



Vertex	Degree
E	3
F	1
G	3
H	1

A loop counts as two edges.



Even Vertex:

It's a vertex with an even degree.

Odd Vertex:

It's a vertex with an odd degree.

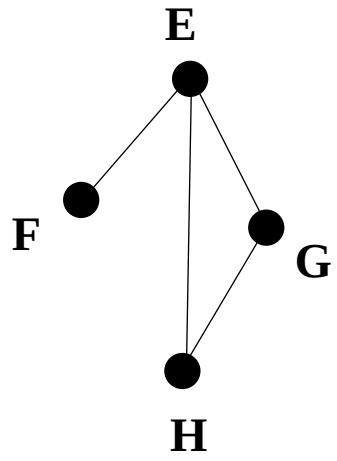
Adjacent Vertices:

It's a pair of vertices that are connected by at least one edge.

Odd vertices: E and F

Even vertices: G and H

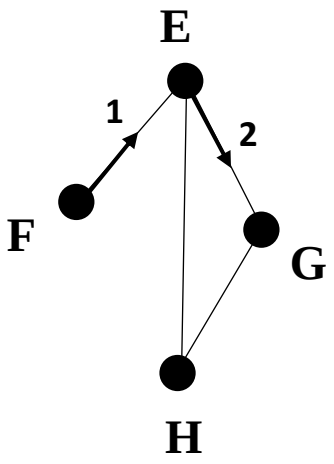
Adjacent vertices: E and F, E and G, E and H, G and H



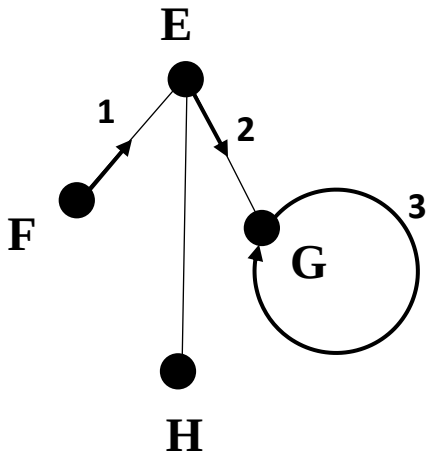
Path:

It's a sequence of adjacent vertices and the edges that connect them. A vertex can appear more than once, but an edge can only be used once.

Examples:



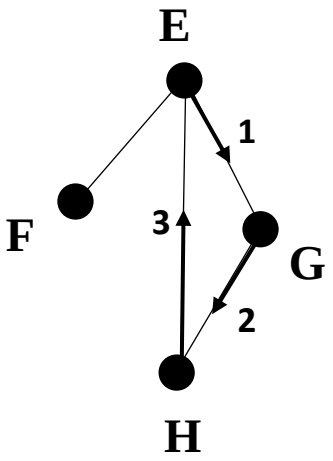
F, E, G



F, E, G, G

Circuit:

It's a path that begins and ends at the same vertex.

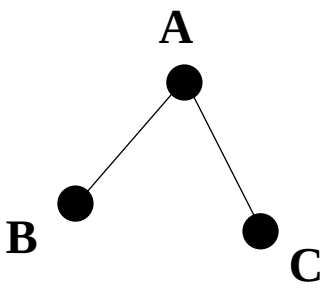


E, G, H, E

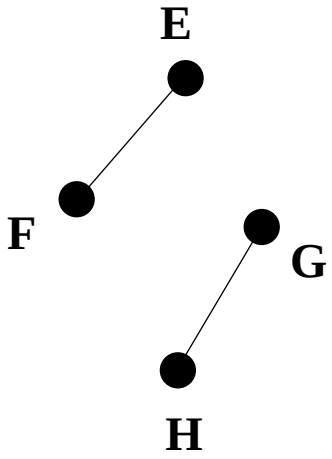
Connected Graph:

It's a graph in which any two vertices can be connected by a path. In other words, the graph consists of one piece. A graph that is not connected is said to be disconnected.

Examples:



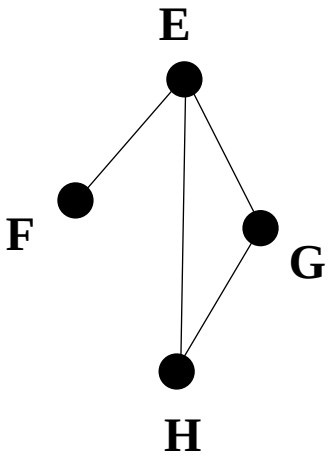
Connected(just one piece)



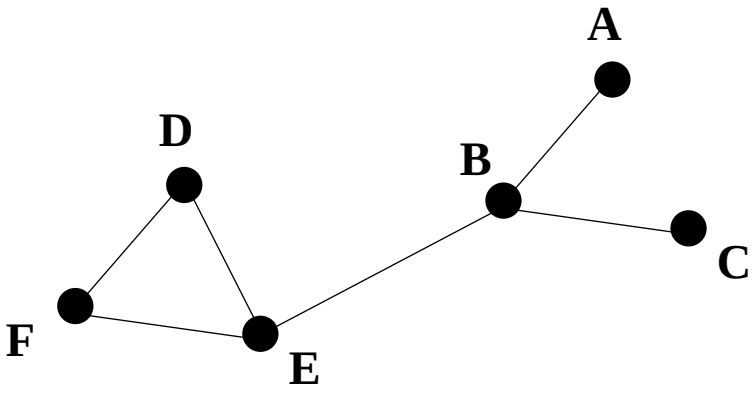
Disconnected(more than one piece)

Bridge:

It's an edge in a connected graph that if removed would leave a disconnected graph.



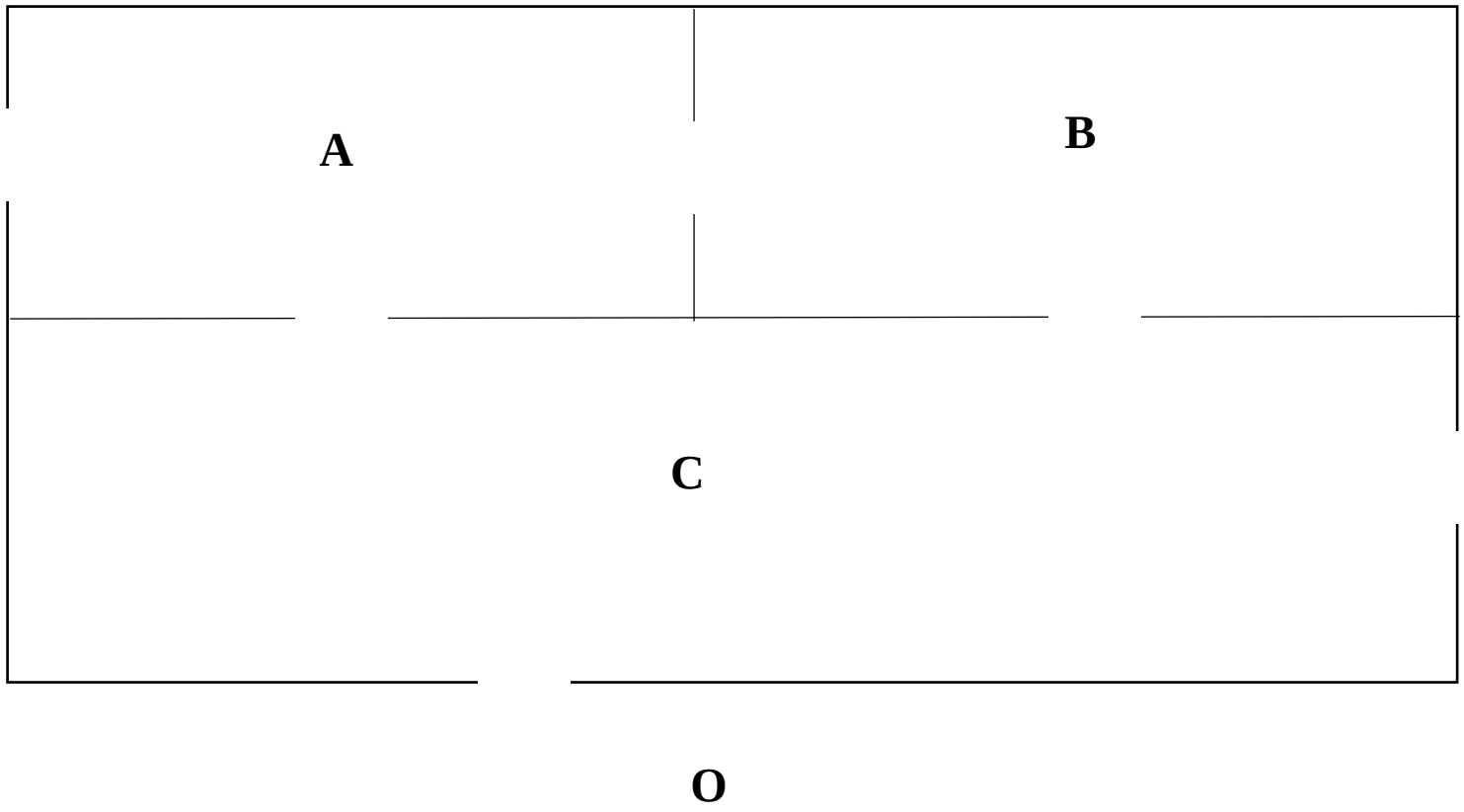
Bridges: $\overline{EF}$ is the only bridge.

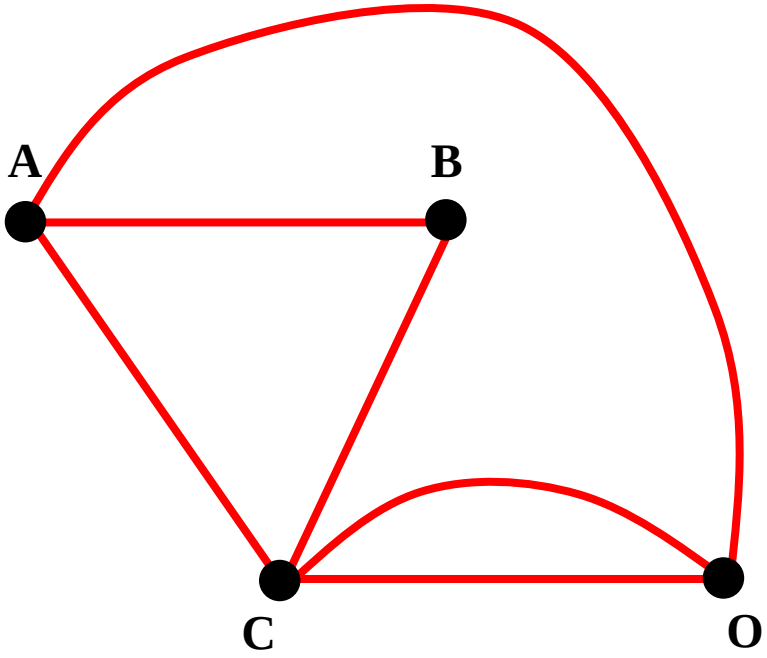


Bridges: $\overline{EB}$, $\overline{AB}$, $\overline{BC}$

Graphs as Models:

Model the building floorplan using vertices as rooms and the exterior and edges for connecting doorways.




A
B
C
O