Introduction to Graph Theory

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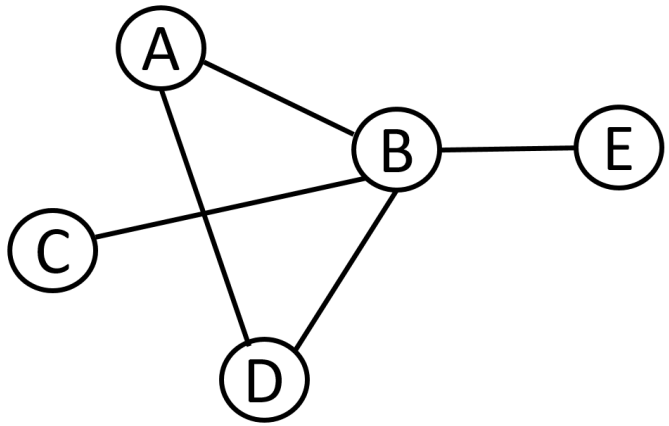
Section 1

Definitions and terminology

What is a graph?

A graph is a set of **nodes**(points) which are connected by **edges**(links)

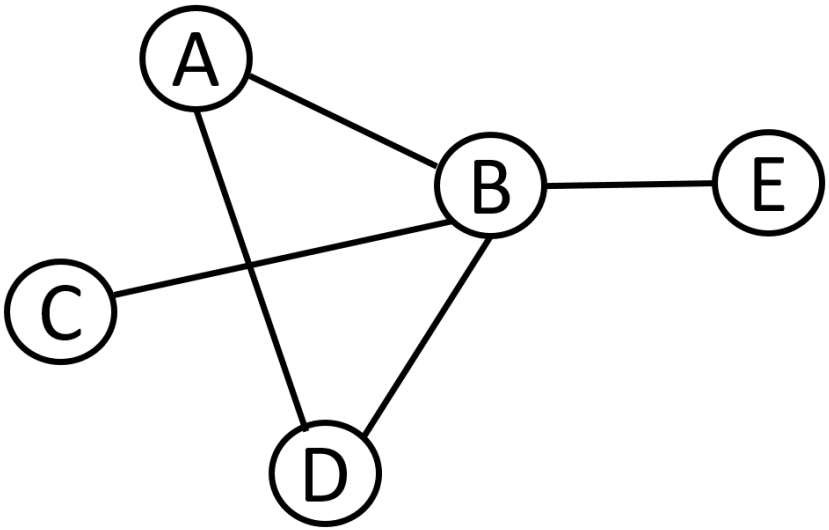
`Examples:`
Nodes: Cities, **Edges:** Roads
Nodes: People, **Edges:** Connections
Nodes: Countries, **Edges:** Boarders



The set of nodes: $N = \{A, B, C, D, E\}$
The set of edges: $E = \{\{A, B\}, \{A, D\}, \{B, C\}, \{B, D\}, \{B, E\}\}$
The graph: $G = (N, E)$

Two types of graphs

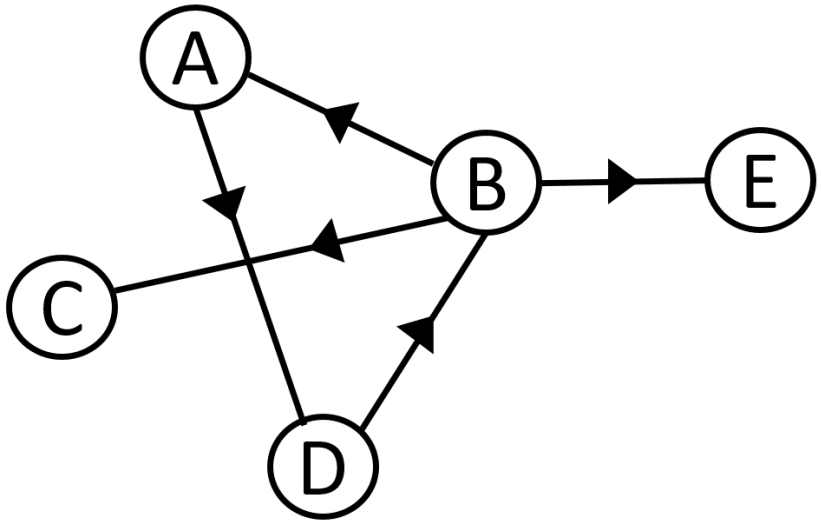
Undirected Graph Edges are not directed (two ways roads, facebook friendships)



No order in the edges, any order is accepted:

$E = \{\{A, B\}, \{A, D\},$
$\{B, C\}, \{B, D\}, \{B, E\}\}$

Directed Graph Edges are directed (one way roads, Instagram follow)



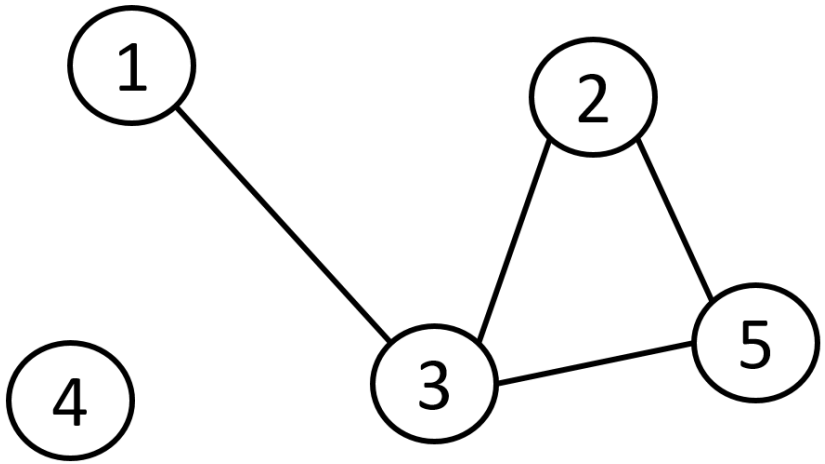
The order is important, we always write: (start,end)

$E = \{(B, A), (A, D),$
$(B, C), (D, B), (B, E)\}$

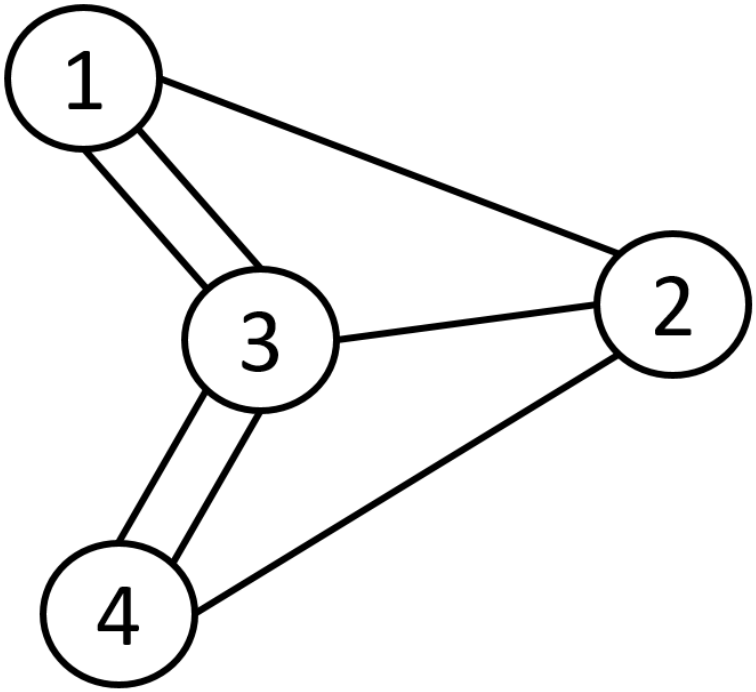
Graphs Vocabulary

- **Ordre of a graph:**$|N|$ It is the number of nodes in a graph.
- **Size of a graph:**$|E|$ It is the number of edges in a graph.

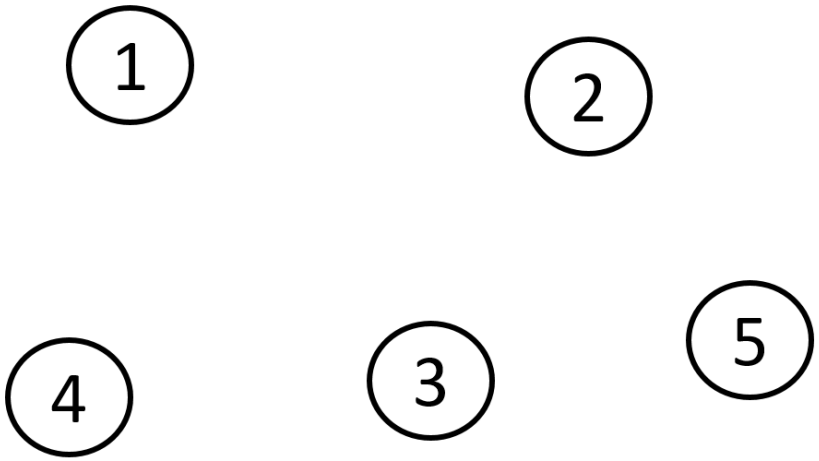
Examples



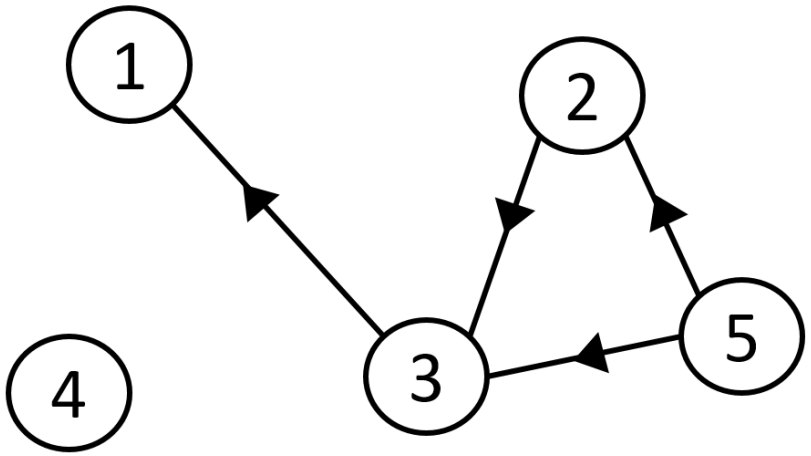
Examples



Examples



Examples



Examples