Lecture 01: Graphs

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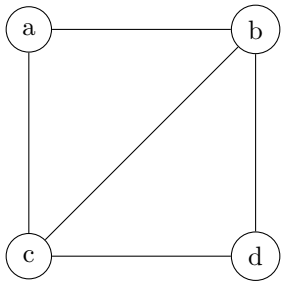
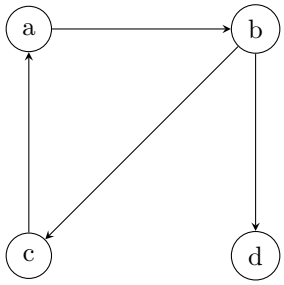
1 Finite graph

A finite graph $G = (V, E)$ defined by the finite set of **edges** $E = \{e_1, e_2, e_3, e_4, e_5\}$.

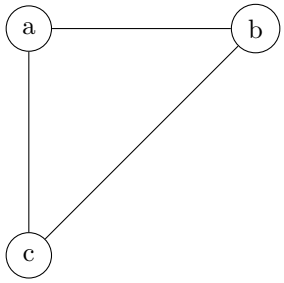


2 Directed graph



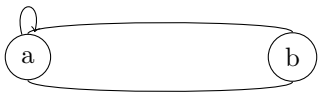
3 Simple graph

A finite graph $G = (V, E)$ is said to be **simple**, if it does not contain a loop and there is no more than one edge connecting two same vertices.



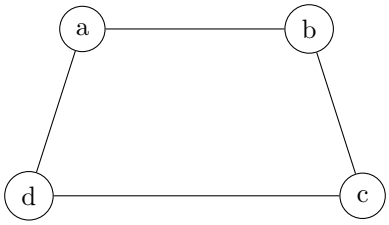
4 Multigraph

A finite graph $G = (V, E)$ is called a multigraph if it contains loops and/or multiple edges connecting the same vertices.



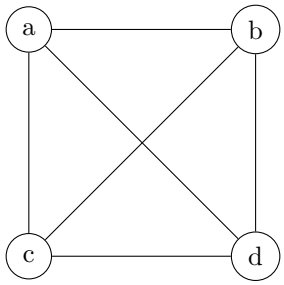
5 Cycle / Circuit

A circuit is a simple closed path (the directions matter). A *cycle* is the same as a circuit but directions do not matter.

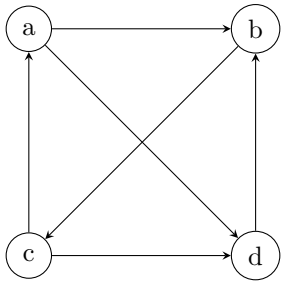


6 Complete graph

If all pairs are adjacent. Example K_4:

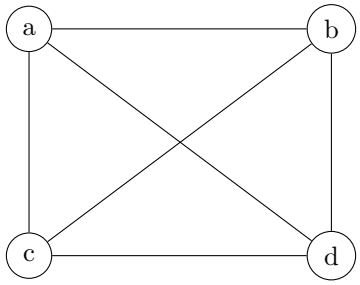


7 Tournament (complete directed graph)



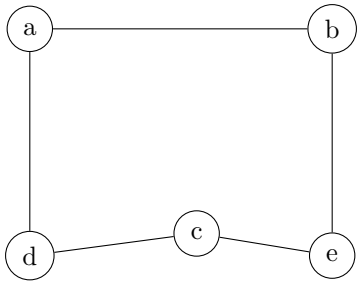
8 Eulerian graph / path / circuit

A chain or cycle is said to be Eulerian if each edge of the graph appears exactly once. A graph/digraph is Eulerian if it admits an Eulerian cycle/circuit.



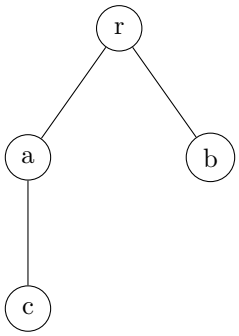
9 Hamiltonian graph / path / cycle

A chain or cycle is said to be Hamiltonian if each vertex of the graph appears exactly once. A graph/digraph is Hamiltonian if it admits a Hamiltonian cycle/circuit.



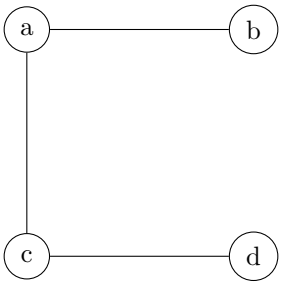
10 Tree

A **tree** is a connected graph containing no cycles.



11 Spanning Tree

A covering tree (**Spanning tree**) is a maximal subgraph of a graph containing no cycles (which is also a tree).



12 Forest

A **Forest** is a set of trees.