

F11

- (simple) graph $G=(V,E)$, $V \neq \emptyset$, $|V| < \infty$.
- visualization
- (vertex) degree, d. sequence, (k-)regular

Thm. Handshake lemma: $\sum d(v) = 2|E|$
Pf

Ex. non-deg seq.

- K_n , C_n (n-cycle), $\bar{G}$, connected (component), subgraph
- isomorphism, isomorphic, ex.

Ex. Are G_1, G_2 isomorphic? $G_1 =$  $G_2 =$ 

if time Ex. How many pairwise non-isom. 2-regular graphs on 9 vertices exist?]

- Eulerian circuit (cycle), path (walk), graph

Thm. Suppose G connected. G Eulerian iff $d(v)$ even $\forall v \in V$.

G has E. path iff exactly two $d(v)$ odd.

Pf sketch

Ex.

- Hamiltonian circuit (cycle), path (walk), graph

Thm (Dirac) If $|V| \geq 3$ and $d(v) \geq \frac{|V|}{2} \forall v \in V$, then G is Hamiltonian.
(Special case of Ore - not in curriculum)

Ex. Prove that $\bar{C}_n$ is Hamiltonian if $n \geq 5$.

Thm. If $k \in \mathbb{N}$ vertices can be deleted (with their incident edges) so that the result has $\geq k+1$ conn. components, then G is not Hamiltonian.

Sketch
may be
enough [Pf.]

Ex. Prove that



is not Hamiltonian.