

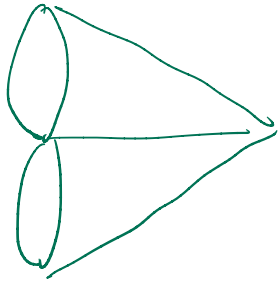
Graph theory:

- Vertices, Edges, Adjacency of vertices, adjacency of edges.

- Self loops.

- Nbd

- degree; \rightarrow with loops $\times 2$



Königsberg & bridges
 \uparrow
Euler

- $E(G)$.

- $V(G)$

- Isolated vertices;

- Degree sequence.

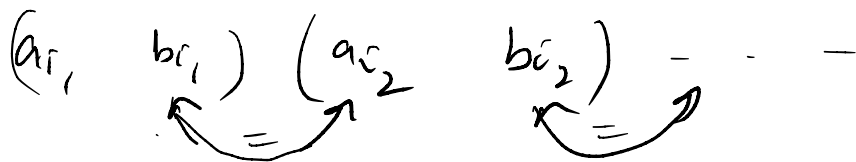
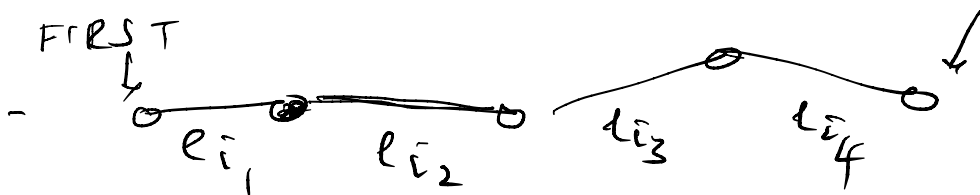
TRAIL: Sequence of distinct

edges $e_{i_1}, e_{i_2}, \dots, e_{i_k}$, with

e_j e_{j+1}

FIRST

LAST



- Closed trail: $a_{i_1} = b_{i_k}$.

Trail

- Walk: Edges may repeat;

path: Is a trail in which
no vertex is repeated.

Def: If $u, v \in V$, we say u & v
are connected in G if there is a
path from u to v .

Lemma: A simple connected graph
has 2 vertices of the same degree.

• Degree sequence -

Havel-Hakimi theorem:

• $d_1 \geq d_2 \geq \dots \geq d_n$ is the degree sequence of a graph iff

$(d_2-1, d_3-1, \dots, d_{d_1-1}-1, d_{d_1+2}, \dots, d_n)$ is the degree sequence of a graph.

• $(3, 3, 3, 3, 3, 3, 3, 3, 3, 3)$

Thm A connected graph G has an Euler tour iff every vertex has even degree.

