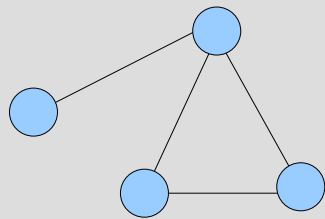


3- choosability of plane graphs

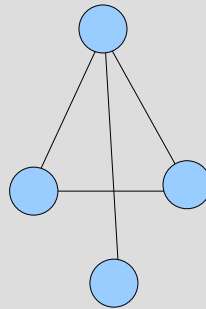
Josef Cibulka
Jan Hladký
Alexandr Kazda
Bernard Lidický
Eva Ondráčková
Martin Tancer

Vít Jelínek

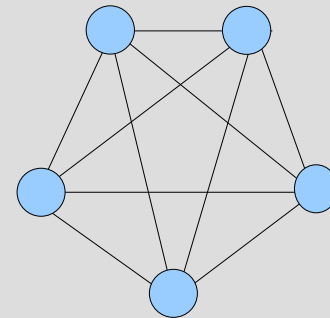
Planar graph



Is planar



Is planar



Isn't planar

Coloring of a graph

- Coloring

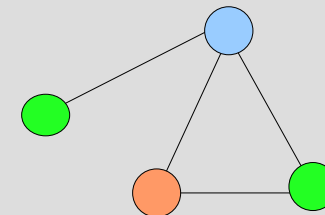
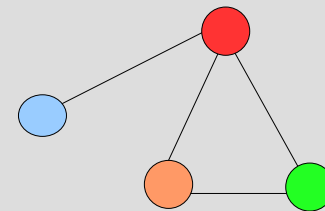
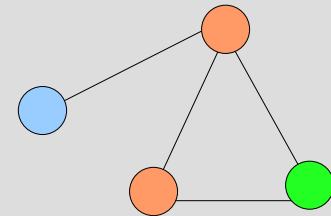
$$col : V \rightarrow \{1 \dots n\}$$

- Proper coloring

$$\forall uv \in E : col(u) \neq col(v)$$

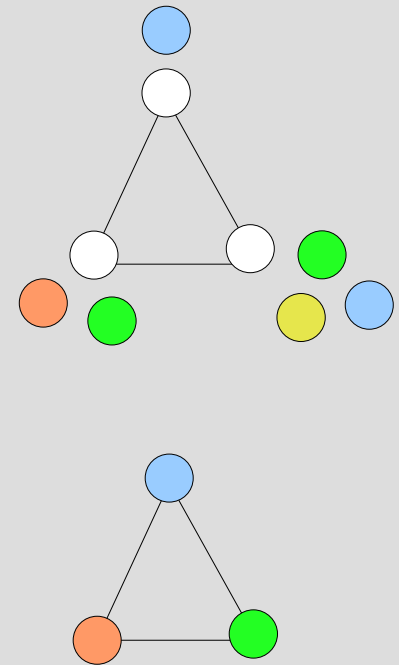
- Chromatic number

$$\chi(G) = \min_n \{ \exists \text{ proper coloring } col : V \rightarrow \{1..n\} \}$$



List coloring

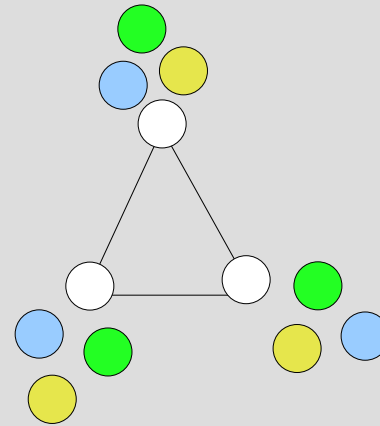
- Every vertex has list of possible colors
- Vertex may get color only from its list
- Proper list coloring – no same color on adjacent vertices
- Choosability



$$\chi_l(G) = \min_n \{ \forall \text{ lists } l \forall v \in V : |l(v)| \geq n \exists \text{ proper coloring} \}$$

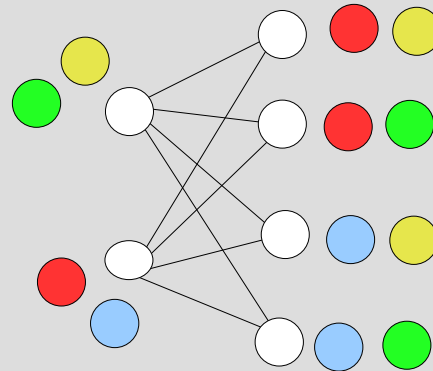
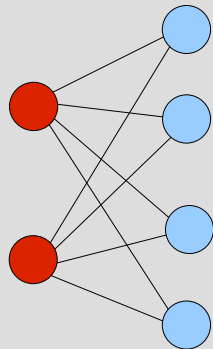
Choosability vs. Coloring

$$\forall G : \chi(G) \leq \chi_l(G)$$



$$\exists G : \chi(G) \neq \chi_l(G)$$

$$\chi(G) = 2$$



$$\chi_l(G) > 2$$

Our Task, What is known

- Every planar bipartite graph is 3-choosable
- Not every planar graph without triangle is 3-choosable
- Try if some locally bipartite graphs are 3-choosable.