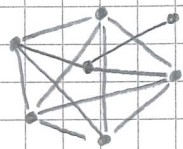


• KTR3

Rep. Planar, Euler

• Pf. of Euler

Ex. 9) Suppose $G=(V,E)$ connected, planar, $|E| \geq 3$. Prove that $|E| \leq 3|V| - 6$ if time [b] ———— $|E| \geq 4$, no 3-cycles. Prove: $|E| \leq 2|V| - 4$ Cor. $K_5, K_{3,3}$ not planar.• Edge subdivision: • G' subdiv. of G if $G \rightsquigarrow \dots \rightsquigarrow G'$.Thm (Kuratowski) G planar $\Leftrightarrow$ No subgraph of G is subdiv. of K_5 or $K_{3,3}$.
($\Rightarrow$ easy, $\Leftarrow$ deep)Ex. Show that  is not planar.• Proper k -colouring, chromatic number $\chi(G)$.ex. $\chi(K_n), \chi(K_{m,n}), \chi(C_n)$ note: bip. $\Leftrightarrow$ has proper 2-colouring ($\chi \leq 2$)

• 4-CT

• Chromatic polynomial $P(G, x)$. (Handout $\exists$)ex. $P(K_n, x), P(\square, x)$

if time [ex. # 5-colourings]

• $G - e, G \cdot e$ thm. (deletion-contraction)

if time [Pf.]

do at least one [Ex. $P(C_4, x)$
Ex. $P(\triangle, x)$]