Math 135 – Graphs (part 4)

Announcements

- Last day!!
- Tomorrow – review session
  1-2pm
- HW is due
- Final – Wednesday
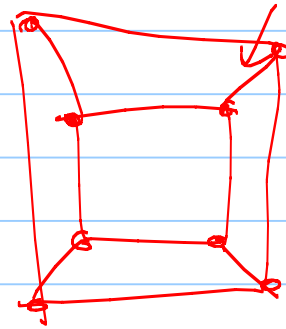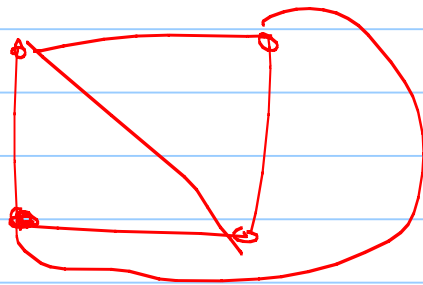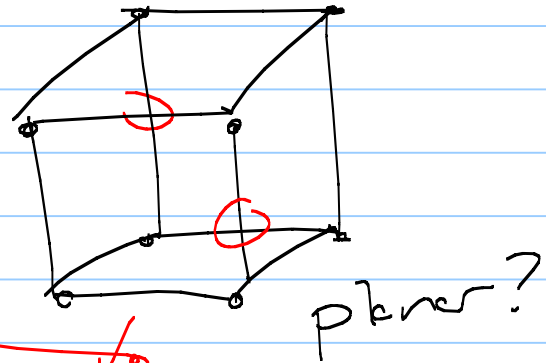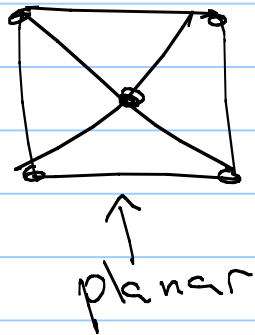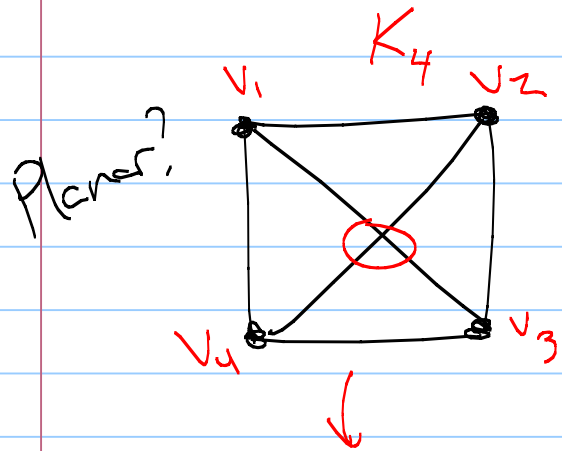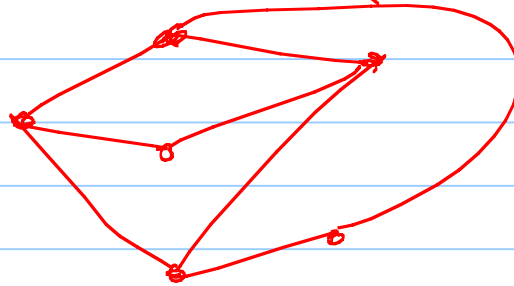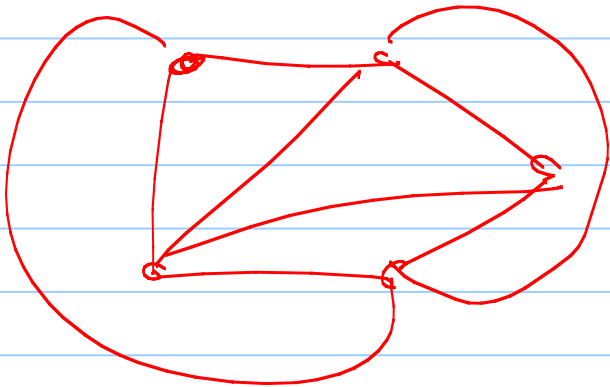
A few final things

- Planar graphs
- Trees
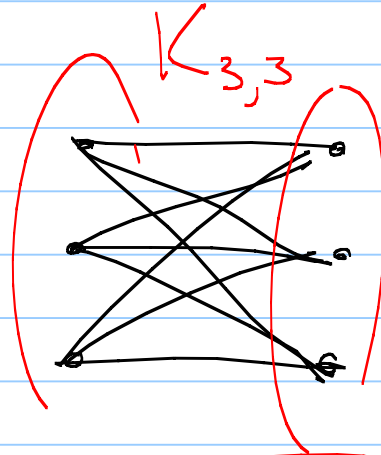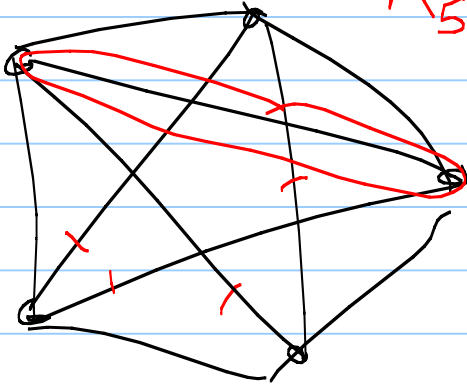
Planar graphs can be drawn in the plane with no edges crossing.

Planar?

K_4

v_1 v_2

v_4 v_3

planar

planar?

Planar?

K_5 is not planar

$K_{3,3}$

Planar graphs can be useful for modeling many things:

- circuit boards   (VLSI design)

- road networks
  (nearly planar)

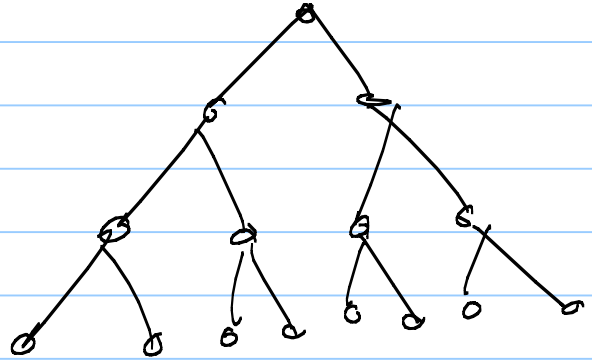## Useful facts
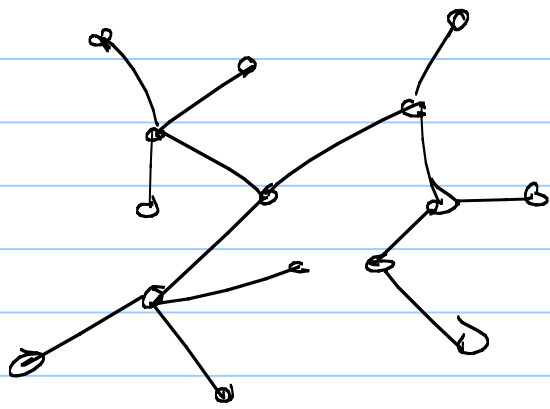
(1) In a planar graph, (n vertices)

$$|E| \leq 3n - 6$$

normally, $|E| \leq \frac{n(n-1)}{2} = O(n^2)$

(2) Every planar graph is 4-colorable

Dfn: A tree is a connected graph with no cycles.

→ no root

Thm: G is a tree $\iff$ there is a unique path between any 2 vertices!

$\implies$ every vertex (with deg >1) is a cut vertex

$\implies$ every edge is a cut edge

Thm: A tree T with n vertices has exactly n-1 edges.

$\underline{O(n)}$

not $O(n^2)$