DIS 3A

PLANARITY

a planar graph can be drawn on a flat plane without crossing edges

Euler's formula

all planar graphs satisfy $v + f = e + 2$

(# vertices + # faces = # edges + 2)

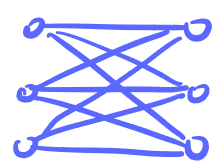
we can use this to derive $e \leq 3v - 6$

! this is not a sufficient test for planarity (some non-planar graphs satisfy this as well)

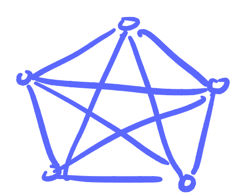
Kuratowski's theorem

a graph is non-planar iff it contains $K_{3,3}$ or K_5

$K_{3,3}$



K_5



4-color theorem

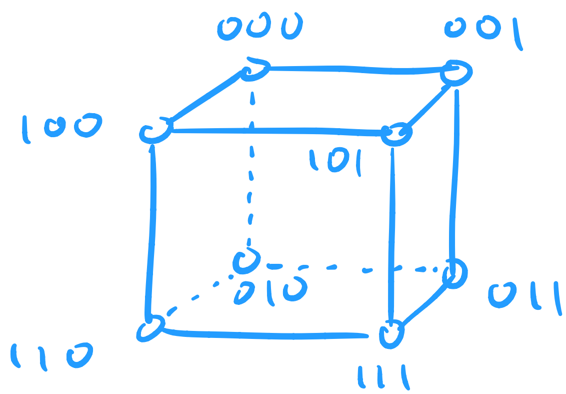
every planar graph can be vertex-colored with 4 colors (no adjacent vertices sharing a color)

HYPERCUBES

in an n-dimensional hypercube:

- each vertex is a bitstring of length n.
- each vertex is connected to those it is one bit away from.

a 3-dimensional hypercube:



notice that:

- we can break an n-dimensional hypercube into a 0- and 1- subcube, each (n-1)-dimensional (defined by the first digits)
- an n-dimensional hypercube has 2^n vertices and $n2^{n-1}$ edges