Lecture 7

This, the last week on our journey through graph theory, has to do with coloring maps. First we see that it is equivalent to color the vertices of planar graphs by creating the dual graph to the map. From there, we use the tools we developed last week for planar graphs to reach our goal, the proof of the five color theorem, i.e., that all planar maps are five-colorable.

Actually all planar maps are four-colorable. This remarkable theorem was proved by reducing the options for the configuration around the induction vertex to a finite number of configurations. The each of the large number of configurations was checked by computer. This was the first proof in which the computer played such a large roll that to this day there is no complete proof of the theorem without using many hundred thousand lines of code, let alone one done strictly the old-fashioned way with pen and paper.