Day One Handout

Sunday, September 13, 2015   1:08 PM

My Facebook friends, October 2012.

Companies spend billions, literally billions, in order to understand such graphs.
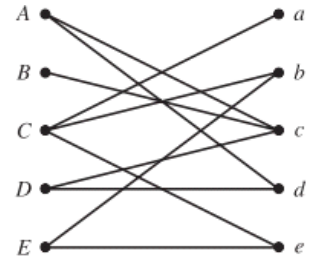

Figure 1.2

Is there a matching?

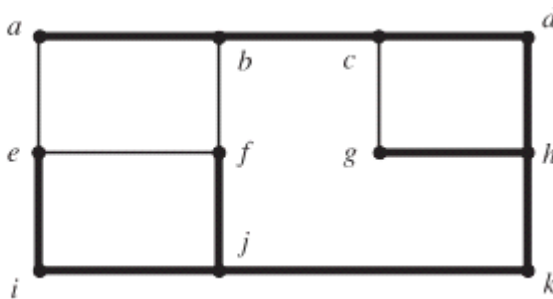If there isn't, it's always for the same reason.

Figure 1.4

Network reliability. How many edges can you remove while keeping this graph connected? How many vertices can you remove keeping the rest connected? What's the smallest connected subset of this graph?
Street surveillance. What's the smallest "edge cover" for this graph?
Scheduling. What's the smallest number of independent sets that cover this graph? What's the largest independent set in this graph?

Theorem. "Edge covers" are complementary to "independent sets".

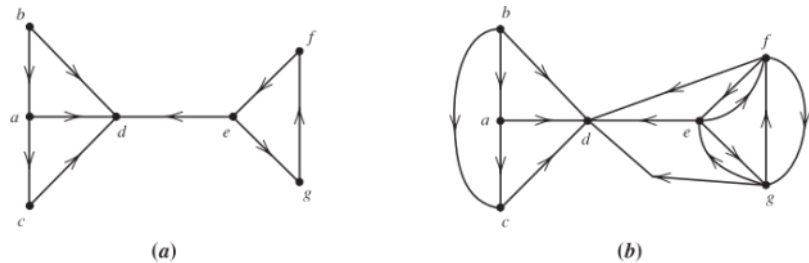**Influence Models.**

(a)   (b)

Figure 1.5

Questions.
1. A soccer game ended with the score 4-4. In how many ways could it have been reached, if it is known that team B never led? (Example way: 00-10-11-21-31-32-42-43-44).
2. In how many ways can a hexagon be presented as a union of triangles made only of its edges and diagonals?
3. A confused mailman delivered 8 pieces of mail addressed to 8 houses, in such a way that no piece of mail arrived at its intended destination. In how many ways could this have been done?