Design and Analysis
of Algorithms I

Contraction Algorithm

The Algorithm

The Minimum Cut Problem

Input: an undirected graph $G = (V, E)$.
  [parallel edges ⊂⊃ allowed]
  [see other video for representation of input]

Goal: compute a cut with fewest number of
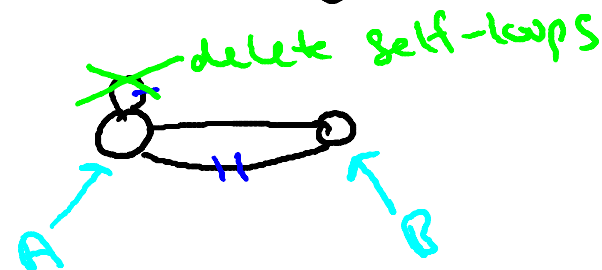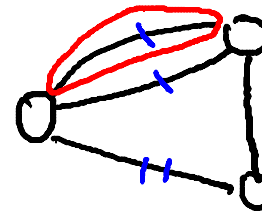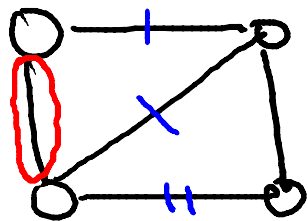 crossing edges. (a min cut)

Random Contraction Algorithm

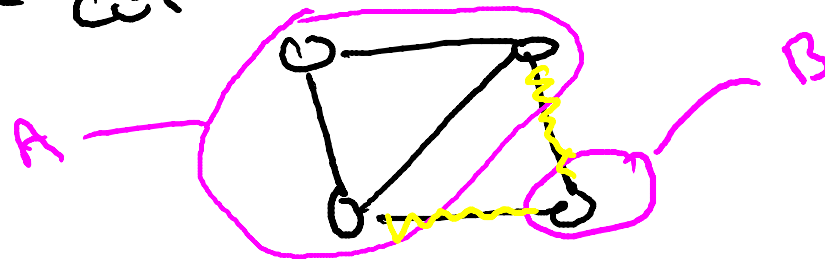[due to Karger, early 90s]

While there are more than 2 vertices:

- pick a remaining edge (u,v) uniformly at random
- merge (or "contract") u and v into a single vertex
- remove self-loops

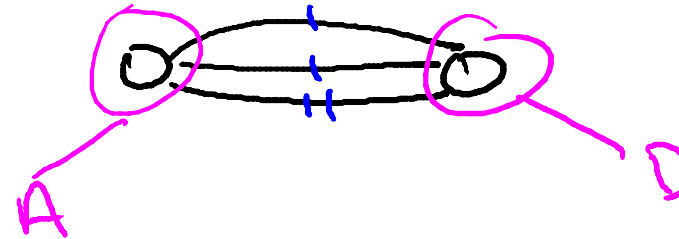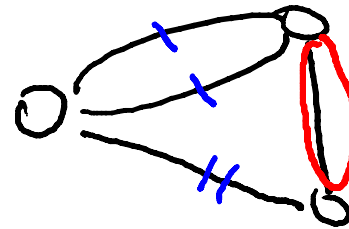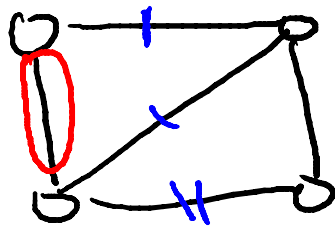return cut represented by final 2 vertices.
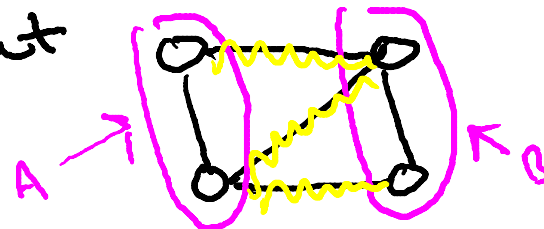
Example

⇒ corresponds to the cut

(a min cut!)

Example (con'd)

KEY QUESTION:
What is probability of success?

⇒ corresponds to the cut

(not a min cut)

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