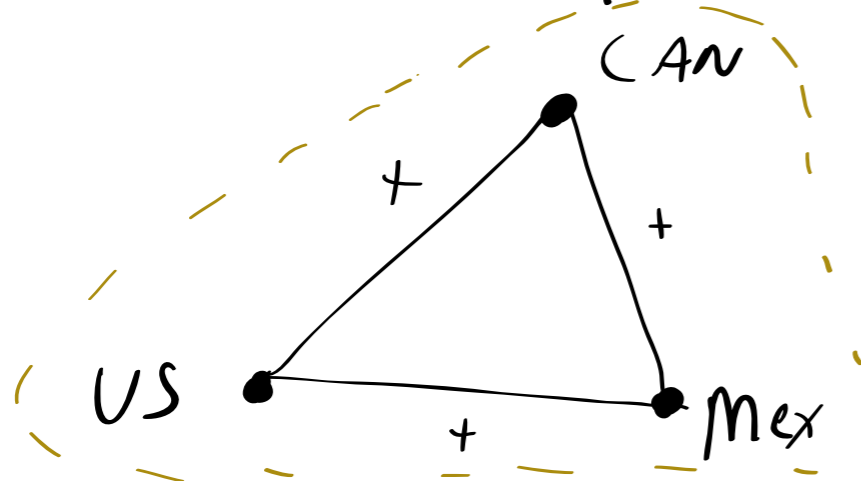


# Lecture #10

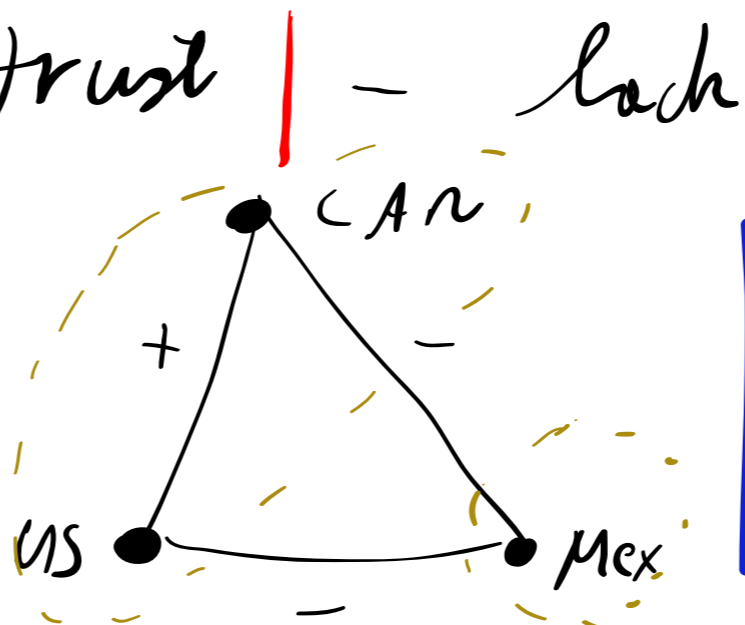
## Signed Graphs, (weighted graphs)

An edge is assigned a "+" or "-";  
this assignment is part of the signed-graph.

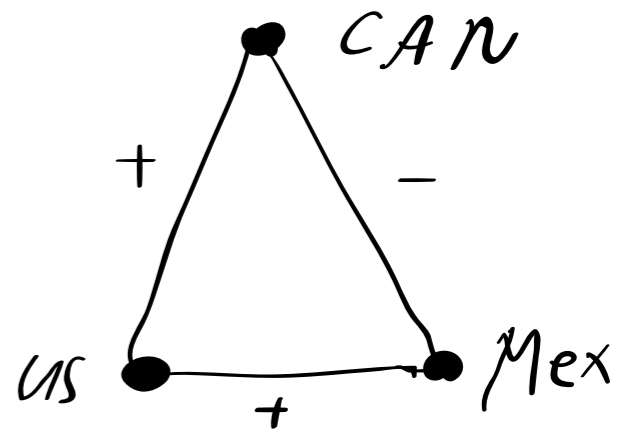
+ indicates trust | - lack of trust



\* "stable"



\*



↑ unbalanced

These signed graphs are balanced

Def: A signed graph is balanced if

there are sets  $A, B \subseteq V(G)$  with

$$A \cap B = \emptyset \quad \leftarrow$$

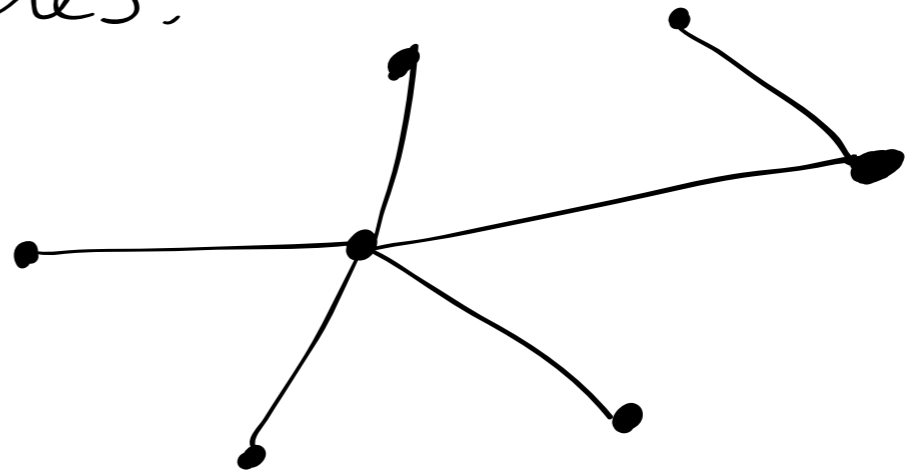
$$\& \quad A \cup B = V(G)$$

s.t. if  $e$  is positive, then  $e$  is  
either incident to only vertices in  $A$   
or incident to only vertices in  $B$ ;

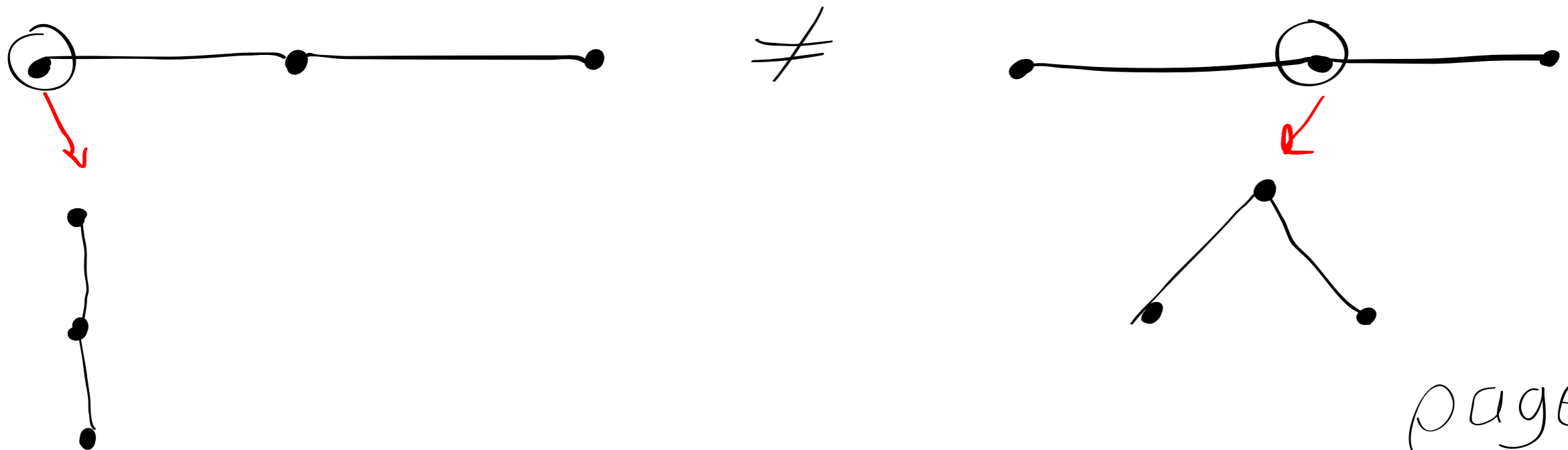
if  $e$  is negative, then  $e$  is  
incident to a vertex in  $A$  and  
a vertex in  $B$ .

The subgraph of all vertices plus all negative  
edges is bipartite.

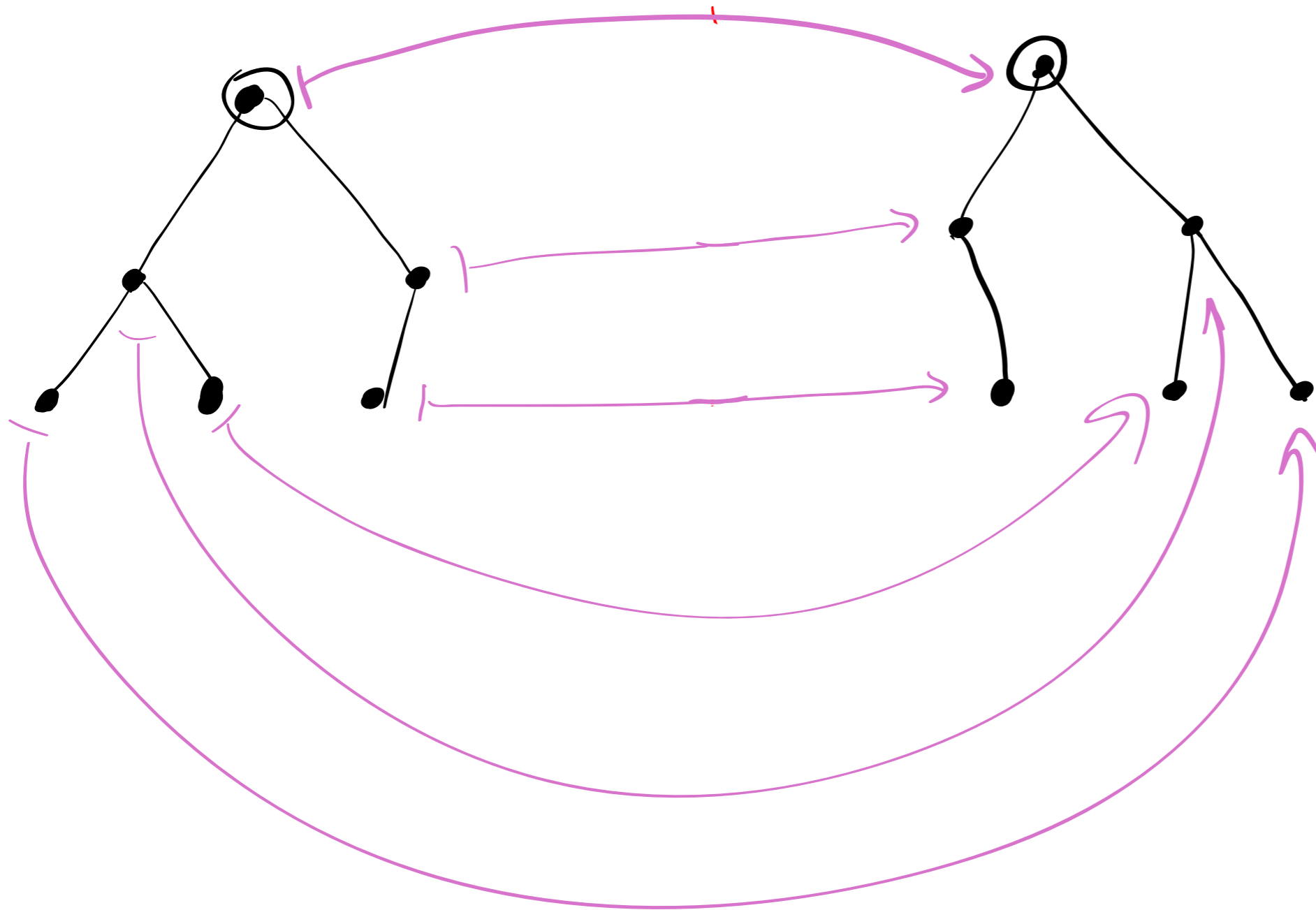
A tree is a graph that is connected and has no cycles.



A rooted-tree is a tree together with a distinguished vertex, called the root.



What should "isomorphism of rooted-trees" mean?



Def: An isomorphism of rooted trees is an isomorphism of graphs that sends a root to a root.

iso  $\implies$  shared Features

iso  ~~$\implies$~~  shared features

(not iso)  $\Leftarrow$  (not sharing a feature).

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