Graph

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ANARC08G - Think I will Buy Me a Football Team

Graph Definition

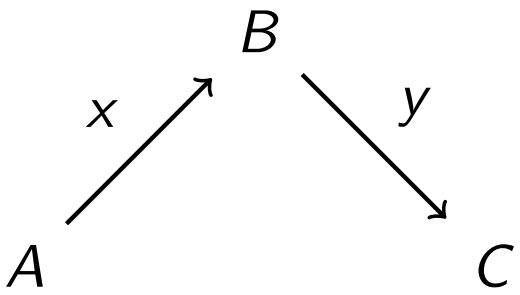
- Each bank is represented as a node.
- Each debt is represented as an arc beetween two nodes labeled with the debt amount.

Questions

- How can you compute the total amount of money needed to settle all debts between the banks?
- How can you reduce this total amount?

ANARC08G - Transitivity Reduction Rule

Transitivity Reduction Rule



Question

The current flow is $x + y$.

How can you reduce the flow?

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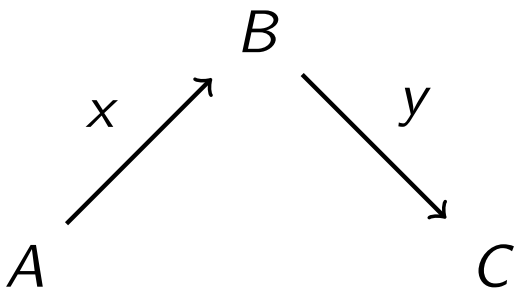


Question

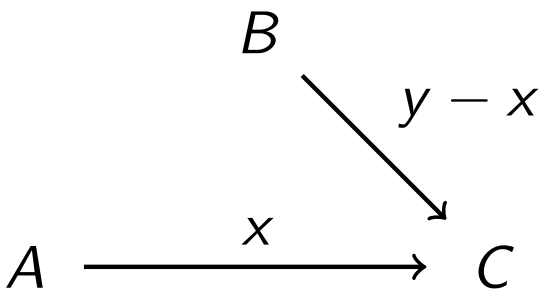
The current flow is $x + y$.

How can you reduce the flow?

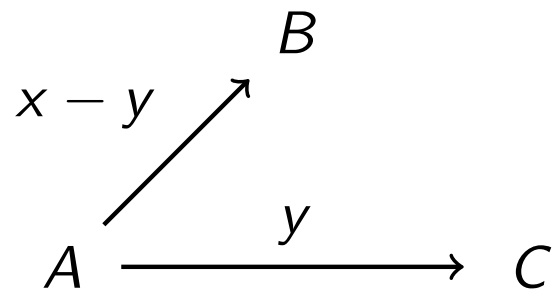
Answer

The flow is reduced to $\max(x, y)$.

$y \geq x$



$y \leq x$



ANARC08G - Fixpoint algorithm

Fixpoint Algorithm

Apply repeatedly the transitivity reduction rule on the graph until it is not possible.

Questions

- What is the complexity of the fixpoint algorithm?
- Which properties are satisfied by the graph when the fixpoint has been reached?
- Is the resulting graph unique?
- Can you propose better algorithm that solves the problem? What is its complexity?