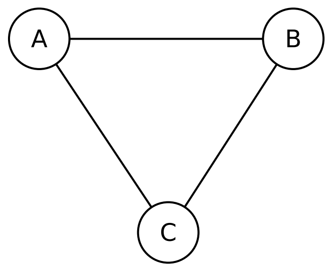
CSC303: Practice Questions 3

Here we go again!

Question 1: Prove that no solution to the following bargaining network is stable



Question 2: The bargaining networks we have seen assign \$1 to each edge. Under this constraint we've seen that a solution (M, v) is stable iff $\forall (A, B) \in E \setminus M : v(A) + v(B) \geq 1$, where $G = (V, E)$ is the underlying network.

If we allow for edges to have different weights (e.g., A and B can split \$1.5, and B and C can split \$0.75, and so on), then does our previous theorem still capture stable solutions (i.e., solutions in which no two nodes out of the matching can make a strictly better deail among themselves)?

Justify your answer.

Question 3: Consider the following matching problem

$m_1 \succ_{w_1} m_2 \succ_{w_1} m_3$
$m_2 \succ_{w_2} m_1 \succ_{w_2} m_3$
$m_1 \succ_{w_3} m_2 \succ_{w_3} m_3$
$w_2 \succ_{m_1} w_1 \succ_{m_1} w_3$
$w_1 \succ_{m_2} w_2 \succ_{m_2} w_3$
$w_1 \succ_{m_3} w_2 \succ_{m_3} w_3$

(a) Run MPDA and FPDA on the given preferences

(b) Which solution is female-pessimal, and which is male-pessimal?

Question 4: If we add a new line in a subway system, then can Braess' paradox emerge? Ignore the time it requires to load/unload travelers. Is it important whether we're considering the travel time of people or subway cars? Is it important whether we consider subway cars to have finite or infinite capacity?