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LINFO1115 Midterm
March 26, 2021

Q1 Weak structural balance property. [2pts]
Define weak structural balance as a local property of a graph.

Q2 Weak structural balance theorem. [2pts]
State the weak structural balance theorem that connects a local and a global graph property.

Q3 Proof of weak structural balance theorem. [5pts]
Give the proof of the weak structural balance theorem. How does your proof handle the division into n groups, where n is not known in advance?

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Proof continued...

Q4 Prisoner's Dilemma. [4pts]
Given the Prisoner's Dilemma game, which has the following payoff matrix:

		Suspect 2	
		Not-Confess	Confess
Suspect 1	Not-Confess	−1, −1	−10, 0
	Confess	0, −10	−4, −4

First, explain why each suspect has a strictly dominant strategy and give the strategy. Second, determine the (one or more) Nash equilibria for this game. Explain how this relates to the suspects' strategies.

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Q5 Nash equilibrium. [4pts]
Given a game with the following payoff matrix:

		Player B	
		L	R
Player A	U	1, 2	3, 2
	D	2, 4	0, 2

Find all pure Nash equilibria in this game. Explain why each is a Nash equilibrium.

Q6 Auctions. [3pts]
In the course we saw four different types of auctions. For this question, explain why the ascending-bid auction and the second-price sealed-bid auction, despite one being a real-time activity and the other having simultaneous bids, give the same results.