Social Computing - Homework 3

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November 7, 2018

Problem 1. (a) True. Let S_A be the strategy chosen by Player A and S_B be the strategy chosen by Player B. In order for (S_A, S_B) to be a Nash Equilibrium, S_A must be the best response to S_B and S_B must also be the best response to S_A. Since we know S_A is dominant for Player A, S_A must be a best response to any strategy chosen by B, including S_B. Since S_B is defined as the best response to S_A, (S_A, S_B) must be a Nash equilibrium.

(b) False. Let S_A be the strategy chosen by Player A and SB be the strategy chosen by Player B. Since (S_A, S_B) is given to be a Nash equilibrium, we know S_A is the best response to S_B and S_B is the best response to S_A. However, there might exist an alternative (SA, SB) such that $S_A^{'} \neq S_A$ and $S_B^{'} \neq S_B$ and $S_A^{'} + S_B^{'} > S_A + S_B$. We can use the Presentation / Exam Study problem given in class as a counter example:

	Presentation	Exam
Presentation	90, 90	86, 92
Exam	92, 86	88, 88

Here, (Exam, Exam) is a Nash Equilibrium in which both players are playing their optimal dominant strategy, but (Presentation, Presentation) is the social-welfare maximizing choice.

Problem 2. There are two Nash equilibria: (D, L) and (U, R).

Problem 3. (a) There is one Nash equilibrium: (D, R).
(b) There is one Nash equilibrium: (U, L).
(c) There are two Nash equilibria: (U, R) and (D, L).