Problem set 2B

<u>With regard to questions similar to questions 1 and 2</u>

1. The outcome coordinated on in the second (last) period has to be a nash equilibrium of the stage game. This could be either a pure strategy or mixed strategy one.
2. You need to specify history dependent strategies which specify what are the strategy each player would take for each possible outcome observed in the first period. Usually we can separate this into 4 cases:
    a. Nobody deviates (Good outcome)
    b. Player 1 deviates but Player 2 does not in period 1 (Punish Player 1)
    c. Player 2 deviates but Player 1 does not in period 1 (Punish Player 2)
    d. Both deviate (this does not matter for formulating the NE)
3. In each case we have to specify strategies in period 2 which "recommend" a specific NE which gives the desired aim of punishing/rewarding.

<u>With regard to strictly competitive equilibria</u>

So there was a question in class about whether we can use something like the last proposition in the lecture to determine whether the game is strictly competitive in pure strategies: for example, checking whether the outcome predicted by the maxmin pure strategies coincides with a (unique?) pure strategy nash equilibrium.

Unfortunately, this does not work.

Consider the strictly competitive game (in pure and mixed strategies because it is constant sum)

	L	R
U	4,1	1,4
D	2,3	3,2

There is no pure strategy nash equilibrium, yet we have max min pure strategies which result in the outcome (D,R):

If Player 1 plays U, his minimum payoff is 1. If he plays D, his minimum payoff is 2. Thus his maxmin pure strategy is to play D.

If Player 2 plays L, his minimum payoff is 1. If he plays R, his minimum payoff is 2. Thus his maxmin pure strategy is to play R.

This counter example shows that we don't have a similar kind of theorem for strictly competitive games in pure strategies. we can't use the above mentioned technique to determine whether the game is strictly competitive. I think the easiest way would be to arrange the things and compare as I have done in class.

Besides, the theorem in the lecture is of the form: If strictly competitive, A iff B. So showing that A iff B does not mean that the game is strictly competitive.

Lastly, for references on checking whether a game is strictly competitive in mixed strategies, refer to example 340.1 in the textbook (I have uploaded it). The solution is on page 566 of the PDF.