

4 Correlated equilibrium

4.1. Consider the prisoners' dilemma game given by

	C	D
C	3, 3	0, 4
D	4, 0	1, 1

- Show that the only correlated equilibrium corresponds to the Nash equilibrium of the game.
- Show that in general a strictly dominated action can never be played in a correlated equilibrium.

4.2. Consider the battle of the sexes with payoffs given in the next matrix.

	L	R
T	3, 2	0, 0
B	0, 0	2, 3

- Find the Nash equilibrium in mixed strategies and a correlated equilibrium that implements the expected payoffs associated to the mixed-strategy equilibrium.
- Find a correlated equilibrium where both players get expected payoffs strictly higher than 2.
- Show that the correlating device $(p_{TL}, p_{TR}, p_{BL}, p_{BR}) = (2/7, 3/7, 0, 2/7)$ constitutes a correlated equilibrium. What are the associated expected payoffs for each player?

4.3. Consider the game

	L	C	R
T	2, 2	0, 3	0, 0
M	1, 1	-1, -1	1, 1
B	0, 0	0, 3	2, 2

- Does the recommendation device that prescribes to play (T,L) and (B,R), each with probability 1/2, constitute a correlated equilibrium? Explain.
- Find a correlated equilibrium where (T,L) and (B,R) are played with positive probability.

4.4. Consider the three-player game with payoffs given below. Player 1 is the row player, player 2 is the column player, and player 3 chooses one of the three matrices.

	L	R
T	0, 0, 3	0, 0, 0
B	1, 0, 0	0, 0, 0

X

	L	R
T	2, 2, 2	0, 0, 0
B	0, 0, 0	2, 2, 2

Y

	L	R
T	0, 0, 0	0, 0, 0
B	0, 1, 0	0, 0, 3

Z

- Find all pure-strategy Nash equilibria.
- Consider the recommendation device that assigns probability 1/2 to each of the following outcomes (T,L,Y) and (B,R,Y).
 - Argue why this cannot be attained with a mixed-strategy equilibrium.
 - Show that it constitutes a correlated equilibrium.
 - Explain in what sense it is desirable for player 3 in this game not to have the information that allows players 1 and 2 to coordinate their actions.
- Find a CE where player 3 obtains payoff 3 with positive probability and avoids payoff 0.

4.5. Find *all* the correlated equilibria of the following game

	L	R
T	6, 6	2, 7
B	7, 2	0, 0