Homework 2

Algorithmic Game Theory — Summer semester 2010

Exercise 1 (10 points)**.** In class, we discussed dominated strategies only in the case of pure strategies, but the definition also works in the case of mixed strategies. Show in the following game that the mixed strategy $(\frac{1}{2}, 0, \frac{1}{2})$ for Player 2 (i.e. equal probability of playing C or E) strictly dominates the pure strategy D, even though neither C nor E strictly dominates D. Then determine all values for p, q such that the mixed strategy $(p, 0, q)$ strictly dominates D.

1 \ 2	C	D	E
A	(1, 0)	(1, 1)	(1, 3)
B	(1, 4)	(1, 1)	(1, 0)

Exercise 2 (15 points)**.** Calculate a mixed Nash equilibrium in the coordination game we saw in class:

1 \ 2	C	D
A	$(0, 0)$	$(-50, -50)$
B	$(-50, -50)$	$(0, 0)$

Exercise 3 (35 points)**.** Consider the following 2-player game:

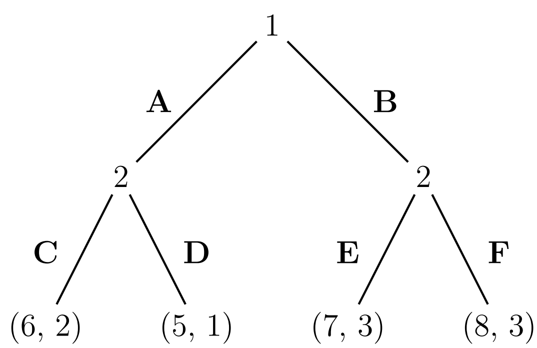
1 \ 2	C	D
A	$(2, 3)$	$(0, 1)$
B	$(1, 0)$	$(4, 2)$

(a) Find all (pure and mixed) Nash equilibria.

(b) Suppose p is defined as follows: $p(BC) = p(AD) = p(BD) = \frac{1}{3}$. Is p a correlated equilibrium?

(c) Now suppose p is such that $p(AC) = \frac{2}{3}$ and $p(BD) = \frac{1}{3}$. Is p a correlated equilibrium?

Exercise 4 (25 points)**.** Consider the following extensive form game:



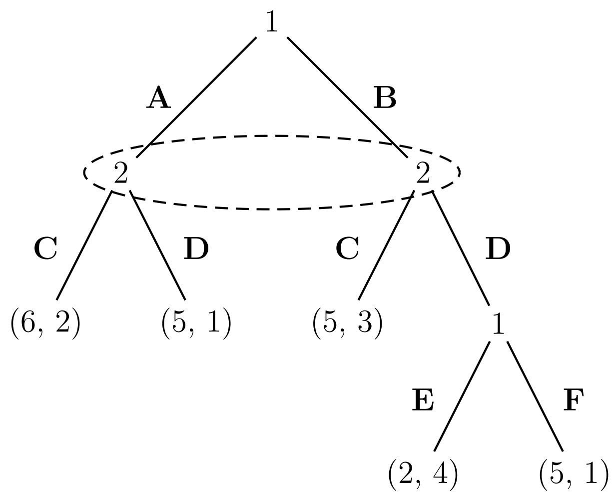
(a) Transform this game into a strategic game.

(b) Use backward induction to find a PNE.

(c) Use the strategic form to identify all PNE.

(d) Identify all subgame perfect Nash equilibria.

Exercise 5 (15 points)**.** Consider the following extensive form game:



(a) Transform this game into a strategic game.

(b) Does this game have a pure strategy Nash equilibrium? If so, find one, and if not, explain why there are none.