

Midterm II (Eco 354)

(1)

(a) Find ALL the pure Nash Equilibria (NE) of the following game

	c1	c2	c3	c4
r1	2, 1	2, 0	4, -2	29, 0
r2	2, 8	8, 20	5, 9	30, 8
r3	1, 12	9, 10	6, 8	8, 11
r4	0, 5	30, 4	7, 5	9, 2

Replace the payoff $(29, 0)$, reached by playing the pure strategies $r1$ and $c4$, as in (b) and (c) below:

(b) $(x, 0)$ in place of $(29, 0)$
 For which values of x is the set of NE the same as in part (a)?

(c) (x, y) in place of $(29, 0)$
 For which values of x and y is the set of NE the same as in part (a)?

2

(2) Find an NE and its payoffs for the following two-person zero-sum game (payoffs are, as usual, for the row player)

	c1	c2	c3	c4
r1	1	2	0	0
r2	0	2	2	1
r3	0	1	-1	0
r4	0	1	-1	-2

(3) Find the TU bargaining solution (i.e. the threat strategies, the disagreement payoffs, the transfers, and the Nash bargaining payoffs) for the following bimatrix games

3(a)

	c1	c2	c3
r1	1, 3	3, 1	2, 2
r2	2, 1	2, 3	1, 2
r3	1, 1	3, 2	3, 3

3(b)

	c1	c2
r1	3, 2	4, 4
r2	2, 4	8, 6

(4) Firms 1 and 2 are engaged in Cournot competition. To produce x units of the output ~~it~~^{the} cost to firm 1 is $\$x^2$ and to firm 2 is $\$3x$. If firm 1 produces x and firm 2 produces y , the price per unit at which both sell their output is given by

$$p(q) = \begin{cases} 10 - q & \text{if } 0 \leq q \leq 10 \\ 0 & \text{if } q > 10 \end{cases}$$

where $q = x + y$ is the total output.

4(a) Compute an NE

4(b) Suppose there are n firms identical to firm 1, and k firms identical to firm 2. Compute a type-symmetric NE. (An NE of the $n+k$ firm Cournot game is called "type symmetric" if all the n firms of type 1 produce the same quantity x^* , and all the k firms of type 2 produce the same quantity y^* . i.e. the NE looks like $(\underbrace{x^*, \dots, x^*}_{n \text{ times}}, \underbrace{y^*, \dots, y^*}_{k \text{ times}})$)