

Econ 4020 – Problem Set II

Due on 03/28

1. Find all the NE, both in pure and mixed strategies, for the following game

	a	b	c	d	e	f
v	0, 0	1, 0	0, 0	5, 0	0, 10	4, 0
w	1, 0	4, 3	9, 1	5, 3	0, 1	2, 1
x	2, 2	0, 2	2, 5	3, 2	8, 1	4, 4
y	7, 3	2, 4	3, 0	7, 1	1, 1	5, 6
z	0, 2	1, 3	8, 1	1, 2	9, 1	0, 3

2. Suppose that Anna and Bob are going to split 100\$, and take turns making alternating offers as in the example covered in class. Find the unique SPNE assuming that there are four rounds of Bargaining, and both Anna and Bob have the same discount factor $\delta = 0.5$.
3. Consider the variant of Nim found on transience.com.au/pearl3.html. Use backward induction to find a winning strategy for the first round (with two columns).
4. Suppose that Anna and Bob play the following simultaneous move game twice, and their total payoffs are the sum of the payoffs they get at each stage. Is there a SPNE on which the players choose (A, x) on the first stage? If your answer is positive you must provide the SPNE describing the strategies *in detail*, if it is negative you must explain why this is the case.

	x	y	z
A	7, 4	1, 7	2, 5
B	4, 5	6, 6	1, 2
C	3, 1	3, -1	4, 11
D	8, 0	6, 2	0, 0

5. Four firms produce an homogeneous good in quantities $q_1, q_2, q_3, q_4 \geq 0$, respectively. Each firm has constant marginal cost equal to 10. The market price is given by the inverse demand function

$$P = 100 - q_1 - q_2 - q_3 - q_4$$

- (a) Find the NE of the game in which all firms choose quantities independently
- (b) Find the SPNE of the game in which firm 1 chooses its quantity first, and the remaining firms choose their quantities simultaneously after observing q_1
- (c) What is the maximum joint profit that the firms could generate if the quantities they produce were contractible?
- (d) Rank the joint profits of the firms in each of the previous scenarios.