

Feedback — Problem Set 1

You submitted this homework on **Thu 10 Jan 2013 2:19 PM CET**.
You got a score of ~~6.00~~ ^{7.5} out of 9.00. You can [attempt again](#), if you'd like.

Question 1

Dominance

1\2	x	y	z
a	1,2	2,2	5,1
b	4,1	3,5	3,3
c	5,2	4,4	7,0
d	2,3	0,4	3,0

Find the strictly dominant strategy:

- ☐ 1) a;
- ☐ 2) b;
- ☒ 3) c;
- ☐ 4) d;
- ☐ 5) x;
- ☐ 6) y;
- ☐ 7) z

Question 2

Dominance

1\2	x	y	z
a	1,2	2,2	5,1
b	4,1	3,5	3,3
c	5,2	4,4	7,0
d	2,3	0,4	3,0

Find the very weakly (not only strictly) dominant strategy:

- ✓
- ☐ 1) a;
 - ☐ 2) b;
 - ☐ 3) c;
 - ☐ 4) d;
 - ☐ 5) x;
 - ☒ 6) y;
 - ☐ 7) z

Question 3

Dominance

✓

1 \ 2	x	y	z
a	1,2	2,2	5,1
b	4,1	3,5	3,3
c	5,2	4,4	7,0
d	2,3	0,4	3,0

0 4 4 0 5 3
4 0 0 4 5 3
3 5 3 5 6 6

When player 1 plays d, what is player 2's best response:

- ☐ a) Only x
- ☒ b) Only y
- ☐ c) Only z
- ☐ d) Both y and z

Pure Strategy Nash Equilibria

Question 4

Dominance

1 \ 2	x	y	z
a	1,2	2,2	5,1
b	4,1	3,5	3,3
c	5,2	4,4	7,0
d	2,3	0,4	3,0

Find all strategy profiles that form pure strategy Nash equilibria (there may be more than one, or none):

2 player game:

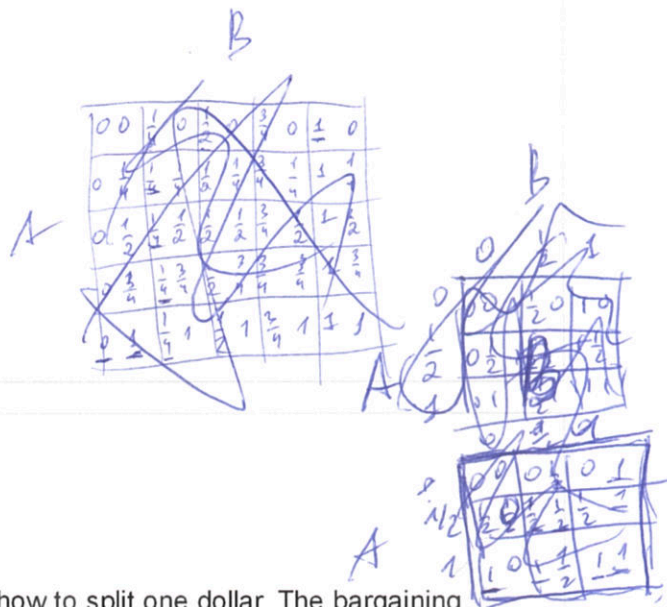
- for each strategy of opponent, underline own best result
- a cell with 2 entries underlined represents a p-s NE.

- ☐ 1) (a, x);
- ☐ 2) (b, x);
- ☐ 3) (c, x);
- ☐ 4) (d, x);
- ☐ 5) (a, y);
- ☐ 6) (b, y);
- ☒ 7) (c, y);
- ☐ 8) (d, y);
- ☐ 9) (a, z);
- ☐ 10) (b, z);
- ☐ 11) (c, z);
- ☐ 12) (d, z).

Rational player should never choose a dominated strategy

S dominates T if

- every payoff in S at least as good as corresponding payoff in T
- at least one payoff in S is strictly better.

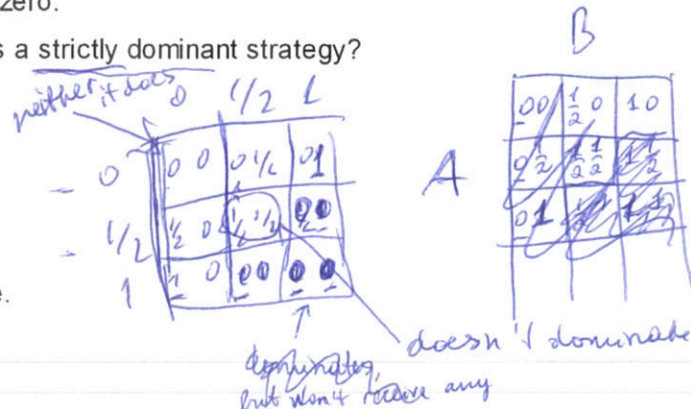


Question 5
Nash Equilibrium - Bargaining

There are 2 players that have to decide how to split one dollar. The bargaining process works as follows. Players simultaneously announce the share they would like to receive s_1 and s_2 , with $0 \leq s_1, s_2 \leq 1$. If $s_1 + s_2 \leq 1$, then the players receive the shares they named and if $s_1 + s_2 > 1$, then both players fail to achieve an agreement and receive zero.

Which of the following is a strictly dominant strategy?

- ☒ a) 1;
- ☐ b) 0.5;
- ☐ c) 0;
- ☒ d) None of the above.



Question 6
Nash Equilibrium - Bargaining

There are 2 players that have to decide how to split one dollar. The bargaining process works as follows. Players simultaneously announce the share they would like to receive s_1 and s_2 , with $0 \leq s_1, s_2 \leq 1$. If $s_1 + s_2 \leq 1$, then the players receive

the shares they named and if $s_1 + s_2 > 1$, then both players fail to achieve an agreement and receive zero.

Which of the following strategy profiles is a pure strategy Nash equilibrium?

- ☐ a) (0.3, 0.7);
- ☒ b) (0.5, 0.5);
- ☐ c) (1.0, 1.0);
- ☐ d) All of the above

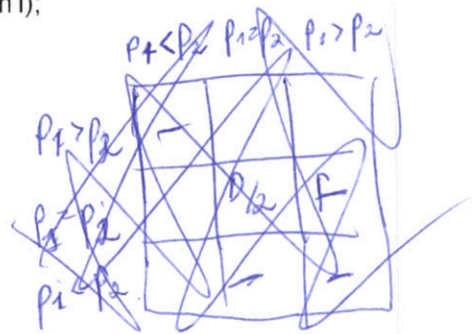
Question 7

Bertrand Duopoly

- Two firms produce identical goods, with a production cost of c per unit.
- Each firm sets a nonnegative price (p_1 and p_2).
- All consumers buy from the firm with the lower price, if $p_i \neq p_j$. Half of the consumers buy from each firm if $p_i = p_j$.
- D is the total demand.
- Profit of firm i is:
 - 0 if $p_i > p_j$ (no one buys from firm i);
 - $D(p_i - c)/2$ if $p_i = p_j$ (Half of customers buy from firm i);
 - $D(p_i - c)$ if $p_i < p_j$ (All customers buy from firm i);

Find the pure strategy Nash equilibrium:

- ☐ a) Both firms set $p = 0$.
- ☐ b) Firm 1 sets $p = 0$, and firm 2 sets $p = c$.
- ☒ c) Both firms set $p = c$.
- ☐ d) No pure strategy Nash equilibrium exists.



Question 8

Voting

- Three voters vote over two candidates (A and B), and each voter has two pure strategies: vote for A and vote for B.
- When A wins, voter 1 gets a payoff of 1, and 2 and 3 get payoffs of 0; when B wins, 1 gets 0 and 2 and 3 get 1. Thus, 1 prefers A, and 2 and 3 prefer B.
- The candidate getting 2 or more votes is the winner (majority rule).

Handwritten payoff matrix for the voting game:

	Candidates	
	A	B
1	1, 0, 0	0, 1, 1
2	0, 1, 1	1, 0, 0
3	0, 1, 1	1, 0, 0

Arrows indicate that voters 2 and 3 have a dominant strategy to vote for B, while voter 1 has a dominant strategy to vote for A.

Find all very weakly dominant strategies (there may be more than one, or none).

- ☒ a) Voter 1 voting for A.
- ☐ b) Voter 1 voting for B.
- ☒ c) Voter 2 (or 3) voting for A.
- ☒ d) Voter 2 (or 3) voting for B.

Question 9

Voting

- Three voters vote over two candidates (A and B), and each voter has two pure strategies: vote for A and vote for B.
- When A wins, voter 1 gets a payoff of 1, and 2 and 3 get payoffs of 0; when B wins, 1 gets 0 and 2 and 3 get 1. Thus, 1 prefers A, and 2 and 3 prefer B.
- The candidate getting 2 or more votes is the winner (majority rule).

Find all pure strategy Nash equilibria (there may be more than one, or none)?

- ☐ a) All voting for A.
- ☐ b) All voting for B.
- ☒ c) 1 voting for A, and 2 and 3 voting for B.
- ☐ d) 1 and 2 voting for A, and 3 voting for B.

	A	B
1	<u>1</u> , 0	0, <u>1</u>
2	0, 0	1, <u>1</u>
3	0, 0	1, <u>1</u>

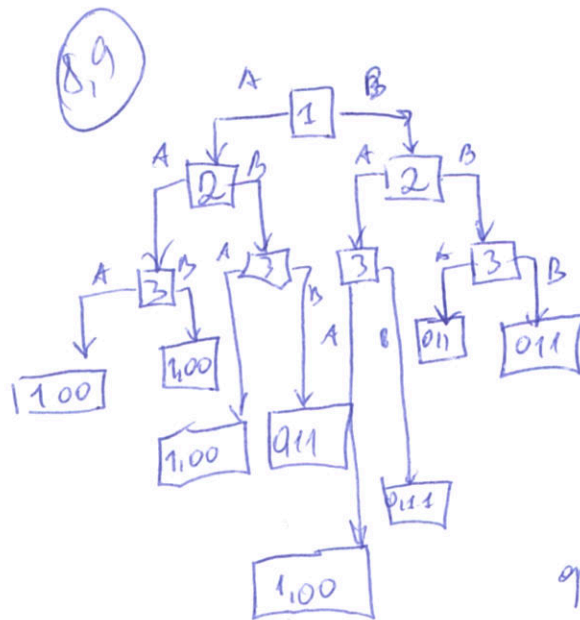
P \ Cand	A	B
1		
2		
3		

1 can vote A → 1
 B → 0

2 can vote A → 0
 B → 1

3 can vote A → 0
 B → 1

1, 6, 7 - none selected



Weakly dominant
means that for a player, given any possible combination of strategies for the rest of the players, he has an option that is better/equal to as the rest for any combo