



# Homework 5

On the day of the exam – before the exam in piles by group number

Homework must be submitted in the lecture on the due day. Submissions in any other way or time will be ignored with no exceptions. Your name and your group number must be clearly visible on the top right corner of your paper. Submit your assignment in a professional way: in A4 sheets, neatly written and clean. Multiple sheets must be stapled together. Do not use plastic folders. Failure to meet any of the above requirements will be penalized with a 50% reduction in your score. Show your work in a sufficient manner.

Publication of the answers of this homework is illegal according to the Russian legislation (tampering with public records and state evaluation). HSE has notified the *Federal Police* for the previous leak of homework solutions, one of the leakers has already been identified and the university is in the process of seeking criminal and civil responsibility against this individual.

1. Find the NE in the following simultaneous game between player 1 and player 2. [10p]

P1 \ P2	L	R
T	-1, -1	-10, 0
B	0, -10	-8, -8

2. Find the NE in the following simultaneous game between player 1 and player 2. [10p]

P1 \ P2	L	R
T	5, 3	2, 2
B	0, 0	3, 5

3. Assume  $c \in (0,1)$  in the following simultaneous game between player 1 and player 2.

P1 \ P2	i	n
I	1, 1	0, c
N	c, 0	c, c

- (a) Find the NE. [10p]  
 (b) Knowing that strategy "i" and "I" correspond to "invest" action and "n" and "N" correspond to "not invest", what is the economic interpretation of this game? Which strategy is less risky and why? [10p]

4. Find the NE in the following simultaneous game between player 1 and player 2. [10p]

P1 \ P2	L	R
T	x, -x	-x, x
B	-x, x	x, -x

5. Firm 1 and firm 2 have one job opening each and they offer wages  $w_1$  and  $w_2$  such that  $0.5w_1 < w_2 < 2w_1$ . There are two risk-neutral workers, each of whom can apply to only one firm. Workers will simultaneously decide to which firm they will apply. If only one worker applies to a given firm, that worker gets the job; if both workers apply to the same firm, one worker is hired at random with probability (i.e. with probability of 50%) and the other worker remains unemployed and gets zero payoff.

- (a) Find the NE in pure strategies in the game that the two workers play. [10p]

(b) Is there a NE in mixed strategies? [10p]

(c) How does the spread between  $w_1$  and  $w_2$  affect the NE in this game? [10p]

6. Five pirates found 100 gold coins and need to decide how to distribute them. The pirates are ranked by strict seniority from the most senior one to the least senior one. The most senior pirate is the first to make an offer. If at least one half of pirates (including the one who made the proposal) accept this offer, coins are distributed accordingly. Otherwise the most senior pirate is executed and a new offer is made by the next most senior pirate. The same rules apply until a decision is taken. Predict the outcome of this game. [10p]

7. Find the IDE in the following simultaneous game between player 1 and player 2. [10p]

P1 \ P2	a	b	c
A	18, 18	15, 20	9, 18
B	20, 15	16, 16	8, 12
C	18, 9	12, 8	0, 0