

Advanced Microeconomics, winter term 2025/26

Exercise 2

Please solve the exercises below by Wednesday, November 5th. We will discuss them in our exercises (see Stud.IP). To obtain a bonus point, you need to upload your answers as a single pdf in the StudIP folder “Student Solutions Exercise 2”. The **document name should start with your surname**. If you prepared the answer in a group of up to 3 students, please only submit one document that contains the names of all contributing students. The DEADLINE is November 5th, 7:30 so that we have a chance to quickly scroll through your submissions to suggest one for presentation.

Question 1 (Synergies)

Two division managers can invest time and effort in creating a better working relationship. Each invests $e_i \geq 0$, and if both invest more then both are better off, but it is costly for each manager to invest. In particular, the payoff function for player i from effort levels (e_i, e_j) is $v_i(e_i, e_j) = (a + be_j)e_i - \frac{1}{2}e_i^2$, where $a > 0$ and $0 < b < \frac{1}{2}$.

- (a) What is the best response function of each player?
- (b) Find the Nash equilibrium of this game.
- (c) Find the efficient solution of this game and compare it to the Nash equilibrium.

Question 2 (Monitoring and mixed strategies)

An employee (player 1) who works for a boss (player 2) can either work (W) or shirk (S), while his boss can either monitor the employee (M) or ignore him (I). Like most employee-boss relationships, if the employee is working then the boss prefers not to monitor, but if the boss is not monitoring then the employee prefers to shirk. The game is represented in the following matrix:

		Player 2	
		<i>M</i>	<i>I</i>
Player 1	<i>W</i>	1, 1	1, 2
	<i>S</i>	0, 2	2, 1

- a) Find all Nash equilibria of this game (i.e. equilibria in pure and in mixed strategies). Do you find the result “realistic”?

Question 3 (Trembling hand)

Consider the following sequential game between Player 1 and Player 2:

- Player A moves first and chooses L1 or R1.
 - If A chooses R1, the game ends immediately with the payoff (2, 2).
 - If A chooses L1, then Player B moves and chooses between L2 and R2:
 - L2 leads to a payoff of (1, 0).
 - R2 leads to a payoff of (3, 1).
- a) Draw the extensive form (game tree) of the game.
 - b) Which Nash equilibria exist, and which solution results from backward induction?
 - c) Which Nash equilibrium is Pareto optimal?
 - d) Is the solution obtained by backward induction in part (a) also trembling-hand perfect?