INSTITUT FÜR VOLKSWIRTSCHAFTSLEHRE
FINANZWISSENSCHAFT
PROF. DR. CARSTEN HELM

CARL VON OSSIETZKY universität OLDENBURG
FAKULTÄT II
INFORMATIK, WIRTSCHAFTS- UND RECHTSWISSENSCHAFTEN

Advanced Microeconomics, winter term 2025/26

Exercise 4

Please solve the exercises below by Wednesday, December 3rd. We will discuss them in our exercises (see Stud.IP). To obtain a bonus point, you have to upload your answers as a single pdf in the StudIP folder "Student Solutions Exercise 3". 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 December 3rd, 7:30 so that we have a chance to quickly scroll through your submissions to suggest one for presentation.

Question 1 (Grim Trigger)

Consider the infinitely repeated game with discount factor $\delta < 1$ of the following variant of the Prisoner's Dilemma:

		Player 2		
		L	*C*	*R*
Player 1	*T*	6, 6	−1, 7	−2, 8
	M	7, −1	4, 4	−1, 5
	B	8, −2	5, −1	0, 0

a) For which values of the discount factor δ can the players support the pair of actions (M, C) played in every period?
b) For which values of the discount factor δ can the players support the pair of actions (T, L) played in every period?
c) Why is your answer different from that for (a)?

Question 2 (Cournot Duopoly and Bayesian Nash-Equilibrium)

Consider a Cournot duopoly operating in a market with inverse demand $P(Q) = a - Q$, where $Q = q_1 + q_2$ is the aggregate quantity on the market.

Both firms have constant unit costs and no fixed costs. The unit costs of each firm can be either high, c_H, or low, c_L, where $c_H > c_L$. Each firm knows its own unit costs. However, each firm only knows that the other firm has probability $\frac{1}{2}$ of having unit costs of c_H and probability $\frac{1}{2}$ of having unit costs of c_L. All of this is common knowledge. The two firms simultaneously choose their quantities.

a) Specify the type space *T*, from which nature draws.
b) Specify firm 1's expected payoff for the cases where it has high costs and low costs. (Hint: You can do that separately, but it is recommended to use an indicator $j = H, L$ so that you have to write only one profit function that covers both cases.)
c) Determine the best-response function of firm 1 for the cases where it has high costs and low costs. Do the same for firm 2. (Hint: See previous hint, determine the first order condition of the expected payoff function and exploit the fact that the two firms are symmetric.)
d) Find the Bayesian Nash-Equilibrium of this game. (Hint: Symmetry also helps when you determine the solution from the 4 best-response functions).