

**Exam**  
**Advanced Microeconomics: Part II (Uwe Jirjahn)**

Winter 2019/20

Choose **two** questions out of the three questions Q1, Q2 and Q 3.

**Q.1** Player 1 and player 2 choose their strategies  $s_1$  and  $s_2$  simultaneously where  $s_1 \in \{X, Y\}$  and  $s_2 \in \{L, R\}$ . The payoff matrix is

Player 2	L	R
Player 1		
X	$1, \theta$	$-\theta, 0$
Y	$\theta, 0$	$1, \theta$

where  $\theta \in \{-2, 2\}$  is privately known by player 1, and  $Prob(\theta = -2) = 0.8$ . Find the Bayesian Nash equilibrium.

**Q.2** Two firms produce homogeneous products. The inverse demand function is:  $p(x_1, x_2) = 40 - x_1 - x_2$ , where  $x_1$  is the quantity chosen by firm 1 and  $x_2$  the quantity simultaneously chosen by firm 2. The cost functions are  $C_1(x_1) = 20x_1$  and  $C_2(x_2) = x_2^2$ . Compute the equilibrium quantities and the equilibrium price.

**Q.3** Two firms produce homogeneous products. The inverse demand function is given by:  $p(x_1, x_2) = 80 - x_1 - x_2$ , where  $x_1$  is the quantity chosen by firm 1 and  $x_2$  the quantity chosen simultaneously by firm 2. The cost function of firm 2 is  $C_2(x_2) = 20x_2$ . The cost function of firm 1 is  $C_1(x_1) = c_1x_1$ . Nature chooses  $c_1 = c_L = 15$  with probability 0.5 and  $c_1 = c_H = 25$  with probability 0.5. While firm 1 observes nature's choice, firm 2 cannot observe that choice. Identify the static Bayesian Nash equilibrium.

**Note:** If you answer all questions, we will only consider Q.1 and Q.2.