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

Advanced Microeconomics, winter term 2025/26

Exercise 5

Please solve the exercises below by Wednesday, December 17th. 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 5". 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 17th, 7:30 so that we have a chance to quickly scroll through your submissions to suggest one for presentation.

_____

Question 1 (First-price sealed bid auction with n players)

Suppose you want to buy a house that is sold by way of a first-price sealed bid auction. In contrast to the model in the lecture, there are more than 2 players. Players simultaneously and independently submit bids $b_i, i = 1, \dots, n$. The house is awarded to the highest bidder who must pay his bid, denoted x. Your conjecture is that each player bids a fraction a of her valuation, i.e. $b_i = a v_i$, where v_i is a player's valuation. Moreover, suppose that you have the following information: You know the number of persons n that bid for the house. You believe the other bidders' values are independently and uniformly distributed over the interval $[0, 1]$, where 1 stands for €1.000.000.

a) What is the probability that your bid x exceeds the bid of player 2?
b) What is the probability that your bid x exceeds the bids of player 2 and 3?
c) Now, what is the probability that your bid exceeds that of all other bidders?
d) What bid should you choose?
e) Explain intuitively how your bid changes with the number of bidders n.
f) Now suppose that your own valuation for the house is €800.000 and that there are 5 other bidders. How much should you bid?

Question 2 (Signalling - Sequential Games of Incomplete Information)

Consider a firm offering a product – let's say an advent calendar – that may be either high quality or low quality (probability 0.3 vs. 0.7). Only the firm knows its own type, but it is common knowledge that 30% of the products are of high quality and 70% are of low quality. The consumer earns a payoff (benefits minus costs) of 100 from purchasing the high-quality product but 0 from purchasing a low-quality product, and she earns 50 if she buys something else with known quality. Furthermore, the firm earns a profit of 100 from selling a high-quality product (since it will have gained a loyal customer), 30 from selling a low-quality product (since it will be a onetime sale and the customer avoids purchasing from the firm ever again), and 0 from not making a sale. Prior to the customer making the purchase, the firm can take a costly action: it can pay 80 for a 30-second Super Bowl ad. Assume that advertising does not increase product awareness, and a priori customers do not consider advertising to be particularly credible. Hence the only purpose of the Super Bowl ad is to serve as a signal.

    a) Write the game in extensive form, similarly as we have done it in the job market signaling model in the lecture.
    b) Find any pooling perfect Bayesian equilibria.
    c) Is there a separating perfect Bayesian equilibrium in which the high-quality firm advertises and the low-quality firm does not?
    d) What exactly does the Super Bowl ad signal, and why does the signal work?