

Markets, Incentives Exam

Question 1 – General Equilibrium (23 points)

Suppose that there are two consumers A and B and two products x and y. The initial endowment ω is such that consumer A is endowed with $(\omega_{xa}, \omega_{ya}) = (5, 1)$ and consumer B is endowed with $(\omega_{xb}, \omega_{yb}) = (4, 3)$. Both consumers have standard preferences and their utility functions are

$$U_A(X_A, Y_A) = X_A Y_A \quad \text{and} \quad U_B(X_B, Y_B) = X_B Y_B.$$

- a) In the Edgeworth box, draw the consumers' indifference curves passing through the initial endowment. Indicate the set of allocations that are Pareto improvements compared to the initial endowment and briefly explain it. (6 points)
- b) State the definition of the Second Welfare Theorem. (2 points)
- c) When does feedback effects stop and what are the formal arguments for feedback effects. (4 points)
- d) What means that markets clear? (3 points)

The next questions are about distributional issues regarding the two individuals and the welfare with different social welfare functions.

- e) Determine the utilities of consumers A and B at their respective initial endowment. (1 point)
- f) Determine consumer A and B's utility when consumer B gives 1 unit of good Y to consumer A. (1 point)
- g) Which allocation in e) or f) is preferred by a Utilitarian welfare function? Explain your decision. (3 points)
- h) Which allocation in e) or f) is preferred by a Rawlsian welfare function? Explain your decision. (3 points)

Question 2 – Oligopoly (25 points)

- a) How can firms compete in Oligopoly? Name at least 3 ways of competition. (3 points)

Consider two firms, firm 1 and firm 2, which produce a homogenous product. The inverse demand function is $P = 15 - Q$. Production cost functions are $C_1(q_1) = 2q_1$ for firm 1 and $C_2(q_2) = 1.5q_2$ for firm 2.

- b) Suppose that firms are in Cournot competition. Determine the equilibrium quantities, price and the equilibrium profit of each firm. (7 points)
- c) Suppose that both firms are in Bertrand Competition. Determine the equilibrium prices and the equilibrium profit of each firm. (4 points)

Consider now that these firms are symmetric. The inverse demand function is still $P = 15 - Q$. Production cost function is $C(q) = 2q$.

- d) Do it like in b) (7 points)
- e) Do it like in c) (4 points)

Question 3 – Oligopoly and Tacit Collusion (25 points)

Consider a situation with two firms, firm 1 and firm 2, which produce a homogenous product. The inverse demand function is $P = 55 - Q$. Production cost functions are $C_1(q_1) = 2q_1$ for firm 1 and $C_2(q_2) = 4q_2$ for firm 2. (Cournot Competition)

- a) Determine the equilibrium quantities and the equilibrium profit of each firm. (5 points)
- b) Suppose that firm 1 is a monopolist (that is, firm 2 does not participate in the market). Determine the monopoly price and firm 1's profit. (4 points)

Assume that firms interact repeatedly for an infinite number of periods.

- c) Determine the optimal deviation quantity for firm 1 and the corresponding profit. (5 points)
- d) Determine the optimal deviation quantity for firm 2 and the corresponding profit. (5 points)
- e) Determine the critical discount factor for firm 1 and firm 2. (6 points)

Question 4 – Asymmetric Information (17 points)

- a) State the definition of screening. (3 points)
- b) State the definition of moral hazard and give three examples for it (6 points)

Consider the following signaling situation:

There are two types of employees: one has high productivity and is worth 150 to the principal, and one has low productivity and is worth 50 to the principal. The probability of a low productivity employee is 0.65 and the probability of a high productivity employee is 0.35.

The employees can invest in education, which do not affect the productivity. However, implementing a level λ of education is less expensive for the high productivity employee than for the low productivity employee. Specifically, investing one unit of education costs 6 for high productivity employee but 8 for the low productivity employee.

- c) Suppose that investing in education was not possible, what is the expected value of employee to the principle? (2 points)

Consider the following constellation: low productivity employee chooses $\lambda=0$, high productivity employee chooses $\lambda=\lambda^*>0$, and the principal pays 150 when seeing a level $\lambda=\lambda^*$ but only 50 when seeing an employee with $\lambda=0$.

- d) Determine the most efficient λ^* so that no employee has an incentive to deviate. (6 points)

Question	1	2	3	4	Total
Possible points:	23	25	25	17	90
Points achieved:					