OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

FAKULTÄT FÜR WIRTSCHAFTSWISSENSCHAFT

77077

Economics IV/Economic Policy
Final Exam
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Prof. Dr. rer. pol. Roland Kirstein
Economics of Business and Law
Faculty of Economics and Management
Vilfredo-Pareto-Bldg. 22, D-003
Otto-von-Guericke-University Universitätsplatz 2
39106 Magdeburg, Germany

Solve 3 out of the 4 problems below. Each problem is worth up to 40 points. The bold figures indicate the maximum points per question. If you answer more than three problems, then the first three in your working sheets will be graded (so make sure to clearly cancel out any answer you don't want to be graded).
The usage of pocket calculators, textbooks, lecture notes, or dictionaries is not permitted.
Notes on this exercise sheet will be disregarded during the grading. Give answers exclusively in your working sheets; please leave a margin of 2cm for comments.
Undecipherable scribbling will not be graded. Use the terminology and the mathematical tools presented in the lecture and the tutorial; make clear how you derive your results.

1. The inverse demand for the good X is $p=a-bx$, where x measures the quantity of X; p is the market price, with $a, b>0$. The aggregate marginal costs of the suppliers are given by $MC(x)=cx$, with $c>0$. The production of X causes a negative externality $E=ex$, where the marginal externality e is positive.

   a) Write down the social marginal cost of the X-production. (**2**)
   b) Determine the socially optimal output level. (**6**)
   c) Derive analytically the total externality if the output level is socially optimal. (**2**)
   d) Determine the aggregate output level chosen by the producers in a "no liability" scenario. (**5**)
   e) Derive analytically the welfare loss caused by the actual output level. (**5**)
   f) Draw a diagram showing the supply and demand curves as well as the externality. Highlight in your diagram the areas that denote the efficient externality and the welfare loss caused by the actual output level. (**15**)
   g) Demonstrate in your diagram the Pigou-tax that induces the suppliers to produce the socially optimal output level.(**5**)

2. In the Q-industry, any one-product-firm would operate with a total cost function $TC(q)=F+vq$, where q denotes the firm's output level.

   a) Write down the average cost AC(q), the marginal cost MC(q), and the variable cost VC(q). (**3**)
   b) Prove that $MC(q)<AC(q)$ if, and only if, AC(q) is declining. (**7**)
   c) Describe two real-world examples for industries with declining average cost. (**8**)
   d) Suppose that AC(q) are declining when intersecting the demand curve. What is the optimal number of firms to operate in this market? (**2**)
   e) Which problem arises if the quantity is supplied at a price equal to marginal cost? (**5**)
   f) What is the second-best optimal price-quantity combination? (**2**)
   g) Assume the market described in d) is operated by a single firm. Explain why an unregulated single firm would not set the second-best price. (**4**)
   h) Draw a diagram showing the AC(q) and the demand curve; indicate the second best solution, the monopoly price, the loss inflicted by price=MC(q), and the welfare loss due to the monopoly price. (**9**)

3. A firm produces a good which creates a profit (returns minus factor cost) of 20 (all figures are present monetary values) and a net consumer benefit of 80. As a byproduct, the firm emits dirt onto the adjacent premises which, in the initial scenario, belongs to no one.

   a) What is the net welfare generated by this production? (2)
   b) A new neighbor moves in who immediately suffers a harm H>0 from the dirt. Discuss briefly who causes this harm. (5)
   c) Describe briefly what property rights and transaction cost are. (6)
   d) What is the efficient allocation of property rights in b) if H=50? If H=150? (2)
   e) The firm could totally avoid the emission by installing a filter which costs K>0.Assume that K=70 or K=120, and that H=50 or H=150. In which scenario(s) is it efficient if
      - the firm uses a filter,
      - the household suffers the harm
      - no production takes place? (12)
   f) Assume that transaction cost (TAC) for the reallocation of property rights are negligible. Which initial allocation of property rights is efficient in the different scenarios identified in e)? (4)
   g) Use an Edgeworth box diagram to explain the invariance and the distribution hypothesis of the Coase theorem. (9)

4. The inhabitants of a cost village make a life catching fish. The annual value of the catch is given by the function $V(b)=ab-b^2$, where b is the number of boats used for fishing, with $a>0$. The cost of operating a boat amounts to c, with $a>c>0$. The population of the village is greater than a-c, and each inhabitant is endowed with enough money to afford just one boat.

   a) Derive the marginal product and the average product. **(4)**
   b) Derive the socially optimal number of boats. **(3)**
   c) What is the individual profit if the number of boats is optimal? **(5)**
   d) Derive the equilibrium number of boats if access is unrestricted. **(3)**
   e) What is the individual profit in equilibrium? **(5)**
   f) Explain verbally why the equilibrium number deviates from the optimal number of boats. **(6)**
   g) Draw a diagram to demonstrate how the equilibrium deviates from the social optimum. **(6)**
   h) What policy measures could be employed to alleviate this problem (and why)? **(8)**