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All questions must be answered on this test form!

For each question you must show your work and (or) provide a clear argument.

Use the last two pages and the back of the form as scratch paper.

Question 1 There are two car dealers A and B . Dealer A sells high quality car. His cost of acquiring a high quality car and servicing to get it ready for sale is 10,000 Dollars. Dealership B sells low quality cars, and their cost of a car is 6,500 Dollars. Consumers would be willing to pay 12,000 Dollars for a high quality car and 7,000 for a low quality car.

Both car dealerships are new, and therefore consumers do not know that A sells high quality cars, and B low quality cars. Consumers believe that cars are high quality and low quality with 50% probability, and are therefore willing to pay at most 9,500 Dollars for a car.

8 points

1. Does dealer A sell any cars? Yes No (circle the correct answer). If your answer is yes, then indicate the possible range for the sales price, p :

2. Does dealer B sell any cars? Yes No (circle the correct answer). If your answer is yes, then indicate the possible range for the sales price, p :

Question 2 *A* currently runs a fast food restaurant and wants to open a restaurant at a different location, which will be run by a manager, *B*. Let e denote *B*'s effort, then the profit of the restaurant will be $f(e) = 100e$. The utility of the manager is $u(m, e) = m - 2e^2$, where m is the payment to the managers and e is effort. Thus, if *A* pays the manager the amount m , then *A*'s payoff is $f(e) - m$. The manager is only willing to take the job if his payoff $u(m, e) \geq 100$.

- (a) Suppose effort, e is observable. Find the effort level e for the manager, and a (fixed) salary payment m that maximizes *A*'s payoff.

8 points

$e =$

A's payoff is

The payment to the manager is $m =$

- (b) Now suppose that effort is not observable. Thus, *A* must specify a payment schedule $f(y)$, where $y = f(e)$ is the restaurant's profit. We learned in class that a payment schedule of the form $s(y) = y - K$ (where K is some number) can be used to obtain the efficient outcome. Determine K that implements the outcome from (a).

4 points

$K =$

Question 3 Suppose a cost function is given by $C(Q) = 200 + 4Q^2$. Then

Average variable costs are .

2 points

Average total costs are .

2 points

Marginal costs are .

2 points

Fixed costs are .

2 points

Average Fixed costs are .

2 points

Question 4 In a competitive market, there are 100 firms with costs $C(Q) = 5Q^2 + 10Q$. Demand is given by $Q_D(P) = 2,000 - 40P$. Then in equilibrium,

5 points

$P =$ _____ , and $Q =$ _____

Now suppose the government introduces a tax of 10 Dollars on firms per unit sold. Thus, the after-tax price and quantity are

$P =$ _____ , and $Q =$ _____

5 points

The government's tax revenue is _____

2 points

Question 5 A firm's cost function is given by $C(Q) = 1,000 + 4Q$. Suppose there are 100 costumers, each of them has a demand function $Q_D(P) = 20 - 2P$. The firm wants to do two-part pricing, i.e., charge a fixed fee F and a price per unit P to maximize profits.

12 points

The profit maximizing $F =$ _____ , $P =$ _____

The firm's total profit (from all costumers) is _____

Question 6 Suppose that there are two types of consumers. Type h consumers have a demand function $Q_D(P) = 10 - P$, while type l consumer have a demand function $Q_D(P) = 10 - 2P$. The firm providing the product has zero marginal costs. It wants to offer contracts $(F_h, Q_h), (F_l, Q_l)$, where F_h, F_l is the fee, and Q_h, Q_l are the quantities supplied to the consumers. Suppose the firm wants to choose $Q_h = 10$ and $Q_l = 2$. The firm wants to choose F_h and F_l to extract the maximum surplus from type l consumers, and from type h consumers, and wants to ensure that type h consumers do not choose (F_l, Q_l) .

12 points

$F_l =$	$F_h =$
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Question 7

- (a) A good is produced both by 100 firms that are located in country A (we refer to them as domestic firms) and 100 foreign firms that only sell the product in country A . We assume that the market is competitive, i.e., firms are price takers. All firms have the same cost function given by $C(Q) = Q^2$. The demand for the the product in country A is given by $Q_D(P) = 1,200 - 100P$. *7 points*

The equilibrium price is $P =$

The equilibrium quantity $Q =$

The profit of each firm is

The net surplus of all domestic consumers is

(Recall the net surplus is the gross benefit of consuming Q units instead of 0, minus the amount of money paid for the Q units)

- (b) Now the government introduces a tariff of 8 Dollars per unit on the foreign firms, thus raising the costs of the foreign firms to $C(Q) = Q^2 + 8Q$ (domestic firms still have the old cost function $C(Q) = Q^2$).

7 points

The equilibrium price is $P =$

The equilibrium quantity $Q =$

The profit of each domestic firm is

The net surplus of all domestic consumers is

- (c) Determine the welfare gain (or loss) from the tariff for country A. This calculation must take the change of consumer surplus, of profits, and the amount of money raised by the tariff into account.

3 points

The welfare gain loss (circle the correct answer) is

Question 8 Suppose there are two firms, with cost functions Their cost functions are given by $C_1(Q_1) = 10 + 2Q_1$ and $C_2(Q_2) = 2 + 4Q_2$. Demand is given by $Q_D(P) = 18 - P$, where $Q = Q_1 + Q_2$. Using the Oligopoly model determine the following:

8 points

The equilibrium price $P =$

The firms' market shares are $s_1 =$, $s_2 =$

Firm 1's profit is , Firm 2's profit is

- (b) Now suppose that firm 1 buys firm 2 for q Dollars. After the purchase, firm 1 is a monopolist and produces with the technology that has the cost function $C_1(Q_1) = 10 + 2Q_1$. Then

6 points

The equilibrium price $P =$ _____, and $Q =$ _____

The firm's profit is _____

Thus, the purchase price $q \leq$ _____.

- (c) Describe (using the box below) what you need to do to determine whether or not the government should allow firm 1 to buy firm 2 (Your answer must be brief and to the point to get credit).

3 points

Not graded: Use as Scratch Paper

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