Waiver Requirements- Microeconomics (MECN 430)

By Application: Only a partial waiver is available by application.

By Exam: Partial waiver available by exam.

A student who is awarded a partial MECN waiver may substitute any full credit MECN course (for a letter grade) to fulfill the requirement.

WAIVER APPLICATION Minimum qualifications include at least one of the following:

- Undergraduate or graduate economics major at an accredited institution
- One intermediate or higher-level course at an accredited institution (a Principles of Economics or introductory course is not sufficient to apply for a waiver by application)
- Microeconomic Analysis (MECN 430) Waiver Application Survey

WAIVER EXAM

2.5-hour exam. Laptop, simple calculator, notes, textbook and computer files allowed. Smartphones, programmable calculators and internet not permitted.

See sample exam on pages below

MECN 430 SCREENING TEST

If in doubt, here are three standard questions that should allow you to evaluate whether taking the waiver exam makes sense for you.

Question 1: In the island nation of Baldonia, the camera maker Minoldak has a monopoly in the market for film cameras. This market consists of two types of consumers, group 1 and group 2, each with different maximum willingness-to-pay for a film camera. Specifically, the willingness-to-pay is given by the following table:

	Maximum willingness-to-pay for film cameras ($)
Consumer of Group 1	200
Consumer of Group 2	500

Each group consists of 100 (identical) consumers, each of whom will buy, at most, one camera. Minoldak's marginal cost of producing an extra camera is equal to $50, independent of the number of cameras sold.

a. What is Minoldak's profit-maximizing price and quantity of film cameras if it cannot price discriminate?

Profit-maximizing price for film cameras ____
Profit-maximizing quantity of film cameras sold __
____

b. Minoldak now considers a strategy of issuing mail-in rebates. It will sell its cameras at a "full" price, but then will offer a rebate to any customer that mails in a "proof of purchase" card. Group 2 consumers are "time-famined" and would never consider mailing in a proof of purchase, while Group 1 consumers would take the time to apply for the rebate (and they correctly anticipate this at the time they make a decision to buy a camera). What is the profit- maximizing full-price for a camera, and what is the profit-maximizing rebate amount?

Profit-maximizing "full" price for film cameras ____
Profit-maximizing rebate _____

c. Let's change the story (in particular, ignore part (b)!) Suppose now that Minoldak starts selling a second type of camera: digital cameras. Minoldak has the monopoly over digital cameras as well, and the marginal cost of making a digital camera equals $50, and is independent of the volume of cameras produced. 100 consumers (Group *D*) prefer digital cameras over film cameras, while another 100 (Group *F*) prefer film cameras. The willingness-to-pay of a typical consumer of each type is given in the following table.

	Maximum willingness-to-pay for digital cameras ($)	Maximum willingness-to-pay for film cameras ($)
Consumer of Group *D*	500	200
Consumer of Group *F*	200	500

What is Minoldak's profit-maximizing price for each type of camera? (Note: Minoldak can set different prices for the two types of cameras, but it <u>cannot</u> charge different prices based on the identity of the consumer)

Profit-maximizing price for digital cameras _______________

Profit-maximizing price for film cameras ________________

d. Let's consider pairs of prices that Minoldak might choose. What are the quantities of film cameras and digital cameras sold if Minoldak sets a price of a film camera equal to $150 and the price of a digital camera equal to

$400?

Quantity demanded of film cameras = ____________

Quantity demanded of digital cameras = ___________

What are the quantities of film cameras and digital cameras sold under the assumption that if Minoldak sets a price of a film camera equal to $75 and the price of a digital camera equal to $400?

Quantity demanded of film cameras = ____________
Quantity demanded of digital cameras = ___________

e. Suppose that another firm, Leikon, enters the market of digital cameras (but not the market for film cameras). Leikon's marginal cost is constant and equals $50. The two firms choose prices simultaneously and independently, once for all. Consumers perceive the two manufacturers' digital cameras as perfect substitutes. What are the equilibrium prices?

Leikon's price for digital cameras = _____________
Minoldak's price for digital cameras = _____________
Minoldak's price for film cameras = _____________

f. Suppose that, after the entry of Leikon into the digital camera market, Minoldak gets an opportunity at exiting the digital camera market. What are the equilibrium prices (simultaneously, independently and once for all) set by each firm if Minoldak exits the digital camera market?

Leikon's price for digital cameras = _____________
Minoldak's price for film cameras = _____________

Based on the previous questions, should Minoldak exit the digital market?

Question 2: Consider a buyer who, in the upcoming month, will make a decision about whether to purchase a good from a monopoly seller. The seller "advertises" that it offers a high-quality product (and the price that it has set is based on that claim). However, by substituting low-quality components for higher-quality ones, the seller can reduce the quality of the product it sells to the buyer, and in so doing, the seller can lower the variable and fixed costs of making the product. The product quality is <u>not observable</u> to the buyer at the time of purchase, and so the buyer cannot tell, at that point, whether he is getting a high-quality or a low-quality good. Only after he begins to use the product does the buyer learn the quality of the good he has purchased.

The payoffs that accrue to the buyer and seller from this encounter are shown below.

		Selle	
		Sell High Quality Product	Sell Low Quality Product
Buyer	Purchase	$5, $6	-$4, $12
	Do Not	$0, -	$0, -$1

The buyer's payoff (consumer surplus) is listed first; the seller's payoff (profit) is listed second.

Please answer each of the following questions. Please use the table above or the space on the next page to show enough of your calculations so that I can follow the logic of your answer.

a. What are the Nash equilibrium strategies for the buyer and seller in this game under the assumption that it is played just once?

Buyer's strategy____________Seller's strategy ____________

b. Let's again suppose that the game is played just once (i.e., the buyer makes at most one purchase). But suppose that before the game is played, the seller can commit to offering a warranty that gives the buyer a monetary payment *W* in the event that he buys the product and is unhappy with the product he purchases (Assume that "unhappiness" is verifiable). What is the smallest value of *W* such that the seller chooses to offer a high-quality product <u>and</u> the buyer chooses to purchase?

c. Suppose that the buyer and the seller will interact over the next three months (this month, next month, and two months from now). What are the Nash equilibrium strategies for the buyer and the seller in this game?

Question 3 Firm 1 and Firm 2 are both planning to invest in carbon fiber production capacity. These companies will be the only two serving the Baldonian market for carbon fiber and will be facing an annual demand curve Q =180 - P where quantity is measured in pounds. Each unit of capacity costs $300 per pound, and each firm has a discount rate of 10 percent, resulting in an annual capital charge associated with the capacity investment of $30 per pound for each firm. The investment, once made, is totally sunk. Once the capacity is in place, there are no other yearly operating costs.

a. Suppose that the choice for capacity in the Baldonian market for carbon fiber is characterized by Cournot competition. What is Firm 2's reaction function? ______

b. What are the Cournot equilibrium capacity choices for the two firms and the market price for carbon fiber? Firm 1 capacity ______

   Firm 2 capacity ____________

   Market price of carbon fiber __

c. Now suppose that Firm 1 is the leader in the market and will install capacity first. Firm 2 is the follower and will make its capacity choice after it observes Firm 1's capacity choice, but before profits are realized. What are the Stackelberg equilibrium capacity choices for the two firms? What is the resulting market price?

   Firm 1 Stackelberg capacity _____________

   Firm 2 Stackelberg capacity _____________

   Market price of carbon fiber _____________

d. Suppose that the situation is still as in part (c). However, suppose that the firms can, if they please, modify their production process without any additional cost and produce synthetic fibers suitable for use in the textile market. The textile market is perfectly competitive and the firms can receive $30 per pound for the fiber they sell in the textile market. The order of moves is as follows:
   (1) Firm 1 chooses capacity,
   (2) Firm 2 observes Firm 1's capacity choice and chooses its own capacity,
   (3) After observing each other's capacity choice, each firm independently and simultaneously decides how much of output to the sell to the carbon fiber market and how much to sell to the textile market.,
   (4) Given the choices made by the firms, profits are realized.

   Under these assumptions, what is the market price for carbon fiber? How many pounds of carbon fiber do the two firms sell to the carbon fiber market?

   Market price of carbon fiber __________

   Quantity sold by Firm 1 to the carbon fiber market ________

   Quantity sold by Firm 2 to the carbon fiber market ________

Answer key

Question 1

(a) The choice is between a price of 500 and 100 customers, and a price of 200 and 200 customers: clearly, it is better to set the price at 500.

(b) It is best to set the full price at 500 and the rebate at 300, so that every customer pays his willingness-to-pay.

(c) As a monopoly, it is clearly best to set each price at 500: everybody buys one camera –which is the most they buy anyway- and pays his willingness-to-pay.

(d) In the first case, the difference in price does not exceed the difference in willingness-to-pay: each customer buys his preferred product, and quantity demanded is 100 for each variety. In the second case, the price difference exceeds the different in willingness-to-pay: that is, even customers who have a natural preference for digital cameras will, at these prices, buy a film camera instead (the consumer surplus is 500 – 400 = 100 from buying a digital camera, while it is 200 – 75 = 125 from buying a film camera). That is, quantity demanded is 200 for film cameras, and 0 for digital cameras.

(e) Because the digital cameras are perfect substitutes, Bertrand competition drives down prices of digital cameras to marginal cost: that is, Leikon's price for digital cameras = Minoldak's price for digital cameras = 50. Since consumers who have a natural preference for film cameras are only willing to pay 300 dollars for such a camera, this imposes on upper bound of 50 + 300 = 350 on the price set by Minoldak on film cameras: Therefore, Minoldak's price for film cameras = 350.

(f) If Minoldak exits the digital market, each firm will have some monopoly power: in fact, it is clear that the Nash equilibrium involves both firms setting a price of 500: to "steal" the rival's customers, a firm would have to cut its price by 300, and thus set a price of at most 200, while only doubling the number of customers: clearly not a good idea. It follows that it is a good idea for Minoldak to exit the digital market, as it increases profit, by decreasing the intensity of price competition.

Question 2

(a) The seller has a dominant strategy: sell low quality product; therefore, the buyer should not purchase.

(b) The payment W must be large enough so that it is better for the seller to offer high quality (that is accepted) rather than low quality, given that W must then be paid. That is, we need 6 > 12 – W, or W > 6. It is then optimal for the buyer to purchase.

(c) Without a warranty, in the last month, the seller will provide low quality. Therefore, the buyer will not purchase. By backward induction, low quality will also provide low quality in the first two months, and the buyer will not purchase then either.

Question 3

(a) $Q_2 = 75 - Q_1/2$

(b) $Q_1 = Q_2 = 50$, $P = 80$

(c) $Q_1 = 75$, $Q_2 = 37.5$, $P = 67.5$

(d) $Q_1 = Q_2 = 50$, $P = 80$. Given capacities, all costs are sunk in second stage. Anticipating this, the Stackelberg advantage disappears.