110/110

ECO 610
Final Exam
TEI Piraeus/University of Kentucky Joint Program

Name___ Answer Key _____

Instructions: Answer each question in the space provided. Point values are indicated beside each question. 100 points total. You have four hours to complete this exam. You may use your textbooks, class notes, handouts, or other written material from the course. Talking with another classmate during the exam is forbidden! You may ask Peter if you have any questions. Please write clearly. Good luck!

1. (10 pts.) Hondos, a local department store, is attempting to determine the profit-maximizing price for one of its best-selling perfumes. The marginal cost to the store of each bottle of perfume is €15.00. The manager of the perfume department has found, based on past price experiments, that:

At a price of:	A 10% change in price will lead to a change in sales volume of:
€20	30%
€25	25%
€30	22%

Given this information, if it is only going to choose between a price of €20, €25, and €30, what price should the store set? Explain how you arrive at your answer.

10 We calculate the elasticity point for each level of price :

price : 20 $\rightarrow E_p = \frac{30\%}{10\%} = 3$

" : 25 $\rightarrow E_p = \frac{25\%}{10\%} = 2,5$

" : 30 $\rightarrow E_p = \frac{22\%}{10\%} = 2,2$

As we can see E_p for all the levels of price is elastic. This means that in order to find the optimal price for the perfume we use the mark-up price rule. $\left(\frac{P-MC}{P} = -\frac{1}{E_p}\right)$ (Inverse Elasticity rule)

price level : 20 $\rightarrow \frac{P-15}{P} = \frac{1}{-(-3)} \Rightarrow P = 22,5$

" : 25 $\rightarrow \frac{P-15}{P} = \frac{1}{-(-25)} \Rightarrow P = 25$

" : 30 $\rightarrow \frac{P-15}{P} = \frac{1}{-(-22)} \Rightarrow P = 27,5$

Only in second level (price = 25) the change in price will lead to 25% increase in sales while equals to the optimal mark-up price rule.

So we choose the price 25 ✓

2. (15 pts.) Your family owns the monopoly rights to sell refreshments on the top of the tallest hill in Athens. There are two different categories of customers. One group is very frugal and hikes up the hill and wishes to consume their water outside. Their demand is given by $Q_1 = 20 - 5P_1$. The second group rides the cable car up the hill and wishes to consume their chilled mineral water in an air-conditioned restaurant. Their demand equation is given by $Q_2 = 20 - 2P_2$. The marginal cost of each liter of water is \$2, and there are no fixed costs. If the firm is able to price discriminate and set a separate price in each market, what will be the profit-maximizing price and quantity for each of the two customer groups? How much economic profit will the firm earn? Illustrate your answer with a diagram.

15 ✓

$Q_1 = 20 - 5P_1 \Rightarrow 5P_1 = 20 - Q_1 \Rightarrow P_1 = \frac{20 - Q_1}{5} \Rightarrow P_1 = 4 - 0,2Q$

$Q_2 = 20 - 2P_2 \Rightarrow 2P_2 = 20 - Q_2 \Rightarrow P_2 = \frac{20 - Q_2}{2} \Rightarrow P_2 = 10 - 0,5Q_2$

MC \$2

To Maximize profit, set MC = MR

$P_1 = 4 - 0,2Q_1$

$TR_1 = P_1 \cdot Q_1$

$TR_1 = 4Q_1 - 0,2Q_1^2$

$MR_1 = \frac{dTR_1}{dQ_1} = 4 - 0,4Q_1$

$MR_1 = MC$

$4 - 0,4Q_1 = 2$

$4 - 2 = 0,4Q_1$

$2 = 0,4Q_1$

$Q_1 = 5$ lt ✓

$P_1 = 4 - 0,2 \cdot 5 = 3$ € ✓

$P_2 = 10 - 0,5Q_2$

$TR_2 = P_2 \cdot Q_2$

$TR_2 = 10Q_2 - 0,5Q_2^2$

$MR_2 = \frac{dTR_2}{dQ_2} = 10 - Q_2$

$MR_2 = MC$

$10 - Q_2 = 2$

$10 - 2 = Q_2$

$Q_2 = 8$ Lit ✓

$P_2 = 10 - 0,5 \cdot 8 = 6$ € ✓

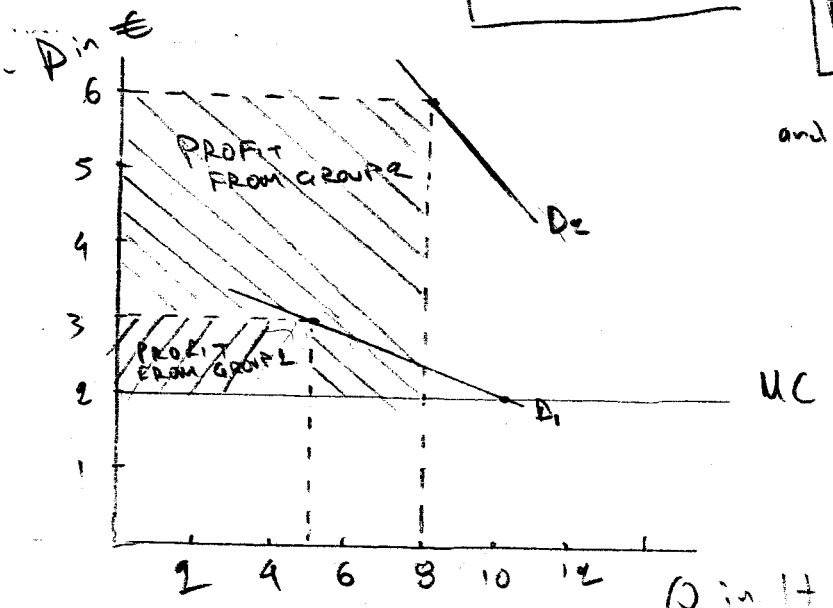
$\Pi = (R - C) \times Q$ and since there are no fixed costs $C = MC$

$\Pi_1 = 5 \cdot (3 - 2) = 5$ €

and

$\Pi_2 = 8 \cdot (6 - 2) = 32$ €

and Total $\Pi = \Pi_1 + \Pi_2 = 37$ € ✓



3. (10 pts.) Your Greek-American brother-in-law Bubbagiotis owns a restaurant/bar in Athens that is economically profitable. He is now thinking about ways that he could increase the economic profits of his business. He has all of the necessary components in place to start a pizza delivery business, operating it out of the back door of his restaurant. All of the costs of this add-on business are clear to Bubbagiotis except for one. He is a bit puzzled about the economic cost of delivering the pizzas once they are made. He would have to hire a delivery driver, but the labor costs are not the issue for Bubba. He is struggling to understand the costs of owning and operating a vehicle for delivering pizzas. He has estimated that at the end of a year he would have incurred the following costs:

purchase price of a slightly used pickup truck	€15,000
gas, oil, and other maintenance	1,000
insurance	1,000
license tags and taxes	500
	€17,500

Bubbagiotis figures that if he sells and delivers 17,500 pizzas per year, he will have to charge an extra euro per pizza just to cover the vehicular (i.e. non-labor) cost of delivering pizzas. He turns to you for advice about his analysis of economic costs. What is your evaluation of his reasoning?

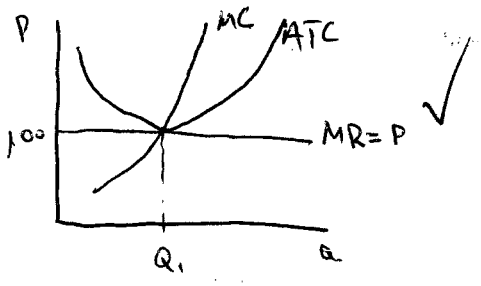
10

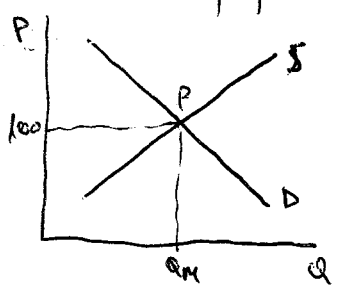
Bubbagiotis has already a truck that worths €15.000, so the only thing he loses is the opportunity cost of the €15000, for example the interest income if the money were on the bank. As far as concerns the depreciation, the depreciation cost as measured by the change in the value market of the truck. So the per pizza vehicular cost would be less than a Euro on 17,500 pizzas

4. (20 pts.) After working in the chicken division of Tyson Foods, Inc. for several years, you are transferred to the alligator division. Tyson has just introduced a new line of alligator meat products, and has gotten a former Miss America to endorse the product line. Your first assignment is to conduct an analysis of the alligator market. You know that Tyson and everyone else pays $0.50 per pound for alligator meat, and that the carcass of a 4-foot long alligator typically yields 40 pounds of meat. The skin of a 4-foot gator sells for $20 per foot. These prices have been relatively constant since the early 1990's, and the stability of the market causes you to conclude that it is in long-run equilibrium.
   a) Illustrate and briefly explain current conditions in the alligator market, using diagrams for the market and a typical alligator farm.
   b) Being closely connected by family ties to the alligator market, you know that some farmers are experimenting with factory farm methods similar to what is done in chicken and pork production. Your cousins Velma and Thelma have found that, with a factory farm that is roughly double the size of most current farms, they can produce 4-foot alligators at an average total cost of $80. In a step-by-step fashion, describe the changes that will occur as this new technology is adopted in the alligator market. Use diagrams to explain what will happen to the price of alligators, the market output of alligators, the average size of a gator farm, short-run profits from gator farming, and the long-run profitability of gator farming.

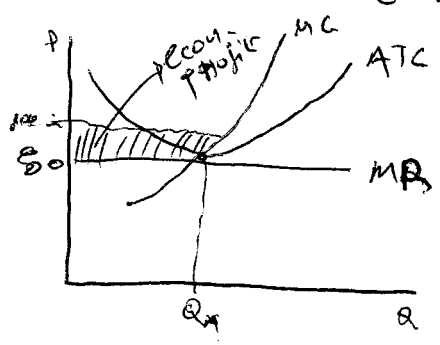
20

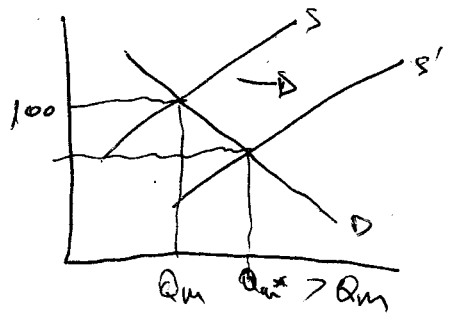
a) The average farm is producing Q_1 gators and earns $TR = 100 \cdot Q_1$ because the characteristics of market is competitive market. and everyone is a price taker. and its economic profits are zero $\Rightarrow TR = TC$.
$Q_M = n \cdot Q_1$, where n the # of farmers that exist





b) At first the factory farms will have econ. profits = $\Pi = Q_* (100 - 80)$ but since Q_* is greater than Q_1 the supply curve will be shifting downward lead to the right eleminating the economics profits of the factory farmers while the market researches the new equilibrium at $(80, Q_M^*)$





5. (10 pts.) You work for a bakery that distributes its products through route salesmen, each of whom loads a truck with an assortment of products in the morning and spends the day calling on customers in an assigned territory. Your boss, the owner of the bakery, believes that some items are more profitable than others, so she asks for an analysis of product costs. Some costs are common to all product categories, such as the rent on the building, managerial salaries, and advertising, while other costs, such as flour and labor, are specific to a particular product. The company's accountants to whom the task is assigned allocate all manufacturing and marketing costs (both fixed and variable) to products to obtain a net profit for each product. By allocating fixed costs in this way, the accountants' figures indicate that some of the products are being sold at a loss, since selling price is less than average total cost. Your boss decides to discontinue producing and selling these products. When this change is put into effect, however, the company's overall profit declines. Since you are getting your MBA, your boss turns to you and asks you to analyze this situation and advise her.

10

The problem here is the allocation in the shared costs. The economic "commandment" that we should recall is that "thou shalt not allocate fixed costs." So in a multiproduct firm as a bakery the correct measure of a products profitability is contribution. So we can say that the product should be retained. It is completely wrong for the manager of the production to advocate a policy that minimizes direct costs per unit of output. Finally we can say that the bakery's successfull strategy would be to maximize the products contribution. Also we must estimate the elasticity of the products ~~[illegible]~~ and then use the optimal markup pricing to examine how well we have priced our products.

6. (10 pts.) You have an exclusive license to sell a particular type of foam fire retardant and insulation used in the construction of commercial buildings. The demand equation for your product is: $Q = 15{,}000 - 10P$, where Q is the annual sales quantity in tons and P is the price per ton. Your total cost function (in dollars) is: $C = 1{,}400{,}000 + 300Q + 0.05Q^2$.
   a) To maximize profit, how much foam insulation should you plan to produce and sell?
   b) What price should you charge?
   c) Compute your profits.

10

$Q = 15{,}000 - 10P$

$C = 1{,}400{,}000 + 300Q + 0.05Q^2 \ (= TC)$

a) Since we have an exclusive license we are a monopolist.

$Q = 15{,}000 - 10P \Leftrightarrow 10P = 15{,}000 - Q \Leftrightarrow$

$\Leftrightarrow P = 1{,}500 - \frac{Q}{10} \Leftrightarrow P = 1{,}500 - \frac{1}{10}Q$

$P = 1{,}500 - \frac{1}{10}Q$

$C = 1{,}400{,}000 + 300Q + 0.05Q^2 \ (= TC)$ ✓

$TR = P \times Q \Leftrightarrow TR = \left(1{,}500 - \frac{1}{10}Q\right) \times Q \Leftrightarrow$

$\Leftrightarrow TR = 1{,}500Q - \frac{1}{10}Q^2$

$MR = \frac{dTR}{dQ} = 1{,}500 - \frac{2}{10}Q = 1{,}500 - \frac{1}{5}Q \Leftrightarrow$

$\Leftrightarrow MR = 1{,}500 - 0.2Q$

As a monopolist we set $MR = MC$

$MC = \frac{dTC}{dQ} = 300 + 0.1Q \Leftrightarrow MC = 300 + 0.1Q$

Thus $MR = MC \Leftrightarrow 1{,}500 - 0.2Q = 300 + 0.1Q \Leftrightarrow$

$\Leftrightarrow \boxed{Q_m = 4{,}000}$ ✓

b) $P_m = 1{,}500 - (0.1) \times (4{,}000) \Leftrightarrow \boxed{P_m = 1{,}100}$ ✓

c) $\Pi = TR - TC = 1{,}500Q - \frac{1}{10}Q^2 - 1{,}400{,}000 - 300Q - 0.05Q$

$= -0.15Q^2 + 1{,}200Q - 1{,}400{,}000 =$

$= -0.15(4{,}000)^2 + 1{,}200(4{,}000) - 1{,}400{,}000 =$

$= -2{,}400{,}000 + 4{,}800{,}000 - 1{,}400{,}000 =$

$= 1{,}000{,}000$

$\boxed{\Pi = 1{,}000{,}000}$ ✓

7. (15 pts.) There are two Toyota/Lexus dealerships in Athens, Electra's Lexus Palace and Oedipus Toyota/Lexus AutoMall. These two car dealers compete with each other for customers who just have to have a new Lexus luxury automobile. Each dealer has three alternative strategies that it could pursue: (1) have a high quality service department; (2) be the low-price dealer on all Lexus automobile sales; or (3) hire a local well-known soccer/football coach and engage in extensive advertising. The payoffs (profits) of these strategies are listed below, with Electra's Lexus Palace's profits being the first number in each cell and Oedipus Toyota/Lexus Automall's profits being the second number in each cell.

		Oedipus Toyota/Lexus Automall:		
		Service	Low Cost	Advertising
Electra's Lexus Palace:	Service	24,33	18,36	15,42
	Low Cost	36,27	24,30	18,24
	Advertising	33,18	30,24	12,18

a) Does either firm have a dominant or dominated strategy? If so, explain why and what the implications are for their strategy.

b) What do you predict will be the outcome of this strategic interaction between these two firms? i.e. what strategy will each firm choose? Briefly explain why.

15

a) Neither Firm has a dominant strategy but both have a "dominated" strategy. The strategy of highlighting service department Quality is dominated by the strategy of being the low price dealer For both Firms. This means that service can be eliminated as an option. The implication is that there are now only 4 options instead of 9.

b) ~~Electra's Lexus Palace will choose the strategy of hiring a well-known Soccer/Football coach and engaging in extensive advertising, while Oedipus Toyota/Lexus Automall will choose to be the low price dealer on all automobiles.~~

With the elimination of the service strategy. the game board is

		Oedipus	
		Low C.	Adv.
Electra	Low C.	24, 30	18, 24
	Adv	30, 24	12, 18

good!

So For ~~Oedipus~~ Electra the best strategy is to go For the Low Cost. since the results make this strategy dominant For them. As For Electra, by using the Nass equilibrium approach, they will go For the advertising strategy, since this strategy maximises their profits

8. (5 pts.) In the battle of Troy, the Greeks sailed to Troy and tried to conquer the city. In formulating their strategy, the Trojans seemed to get it all backwards. What was the Trojan strategy and why would it have worked against them had they been successful?

5

The Trojans strategy was to burn the Greek ships. If the Trojans have succeded the Greeks would have no alternative but to fight till the last man died ~~[illegible]~~ (Could not retreat). Because the Trojans failed, the Greeks used their ships to retreat leaving a gift horse behind that the Trojans were a bit too quick to accept.

9. (15 pts.) Because your sister-in-law happens to be mayor, you were fortunate enough to be awarded the monopoly franchise to provide cable TV services to your hometown Piraeus. As such, you are the only provider and as long as you have no competition, the discounted present value of your economic profit stream is $5,000,000. Trouble looms on the horizon, however, because a satellite TV company is considering entering your market. Your monopoly franchise rights only apply to hard-wired cable TV, and do not apply to satellite signals and rooftop 18-inch satellite dishes. If entry occurs and you share the market with a competitor, your discounted present value of economic profits will fall to $2,000,000. If you contest entry and fight a price "war," the discounted present value of economic profits is -$500,000.

a) You announce publicly that if entry occurs, you will fight. Is your threat credible?

b) In preparation to fight a price war, you could add capacity to your system, so that you could offer additional channels that your competitor did not. The cost of adding such capacity in preparation to battle for customers is $3,500,000. Only if entry occurs would you find it necessary to utilize this capacity. Should you make such a commitment to deter entry? Explain why or why not, using a game tree to illustrate the sequence of moves and payoffs.

15

a) The threat is credible only if the profit is greater than ~~sharing the market~~ in the case at which we will share the market. i.e. if $\pi_w > \pi_d$. But we have $\pi_w = -500{,}000\$$ and $\pi_d = 2{,}000{,}000\$$, so $\pi_w < \pi_d$ and that is why the threat is not credible. ✓

b) we have the following conditions for commitment:

1) $\pi_w > \pi_d$ - Commitment

2) π_m - Commitment $> \pi_d$

In our case we have: $\pi_w = -500{,}000\$$, $\pi_d = 2{,}000{,}000\$$

$\pi_m = 5{,}000{,}000\$$ Commitment $= 3{,}500{,}000\$$

The condition ① is: $-500{,}000\$ > 2{,}000{,}000 - 3{,}500{,}000$

$-500{,}000\$ > -1{,}500{,}000\$$ → satisfied ✓

The condition ② is: $5{,}000{,}000\$ - 3{,}500{,}000\$ > 2{,}000{,}000\$$

$1{,}500{,}000\$ > 2{,}000{,}000\$$ → Not satisfied ✓

I would say that I should not make such commitment. ✓