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(Student's Name: 1 point)

# Industrial Organization

## Midterm Exam

Problem	1	2	3	4	5	6	7	$\Sigma$
Points								

**Description:** The exams consists of 1 (semi) open-ended problem and 6 math problems. You should explain your answers in all problems. Be brief, precise and to-the-point: *things that are not relevant to the problem will not receive credit*. Two extra pages could be found at the back. In the open-ended questions you should show the ability to apply models covered in class to real world phenomena. Math problems are grouped by “topics” purely for your convenience—their actual solution may require any insights covered in class. Next to every problem you can see the amount of points it’s worth (they sum up to **99**). Be smart about your choice of problems. Good luck!

June 13, 2019

## Open-Ended Questions (25 points)

**PROBLEM №1** (25 points) Comedy Cellar, a famous comedy club in the NYU area, uses the following pricing strategy for tickets. The ticket costs \$8, but with it comes an *obligation* to buy a drink inside. This question asks you to rationalize such practice. You will compare it to *uniform pricing*, a strategy when customers can *choose* to buy drinks inside at the prices the bar sets, and the ticket comes with no obligations.

**a (3)** *One possible explanation of the practice is that the comedy club wants customers to be drunk, so that they laugh more. Explain why this argument doesn't rationalize the strategy of the club.*

Here is a simple model to help you with this question. There are two customers who love comedy: a Hipster and a Biker. Both have long beards, so it is hard to tell who is who. The Hipster values the show at \$12, and the Biker values the show at \$8. The bar offers two

	Show	Mojito	Beer
Hipster	12	10	5
Biker	8	7	6

drinks, which customers can only buy if they attend the show: mojito and beer. The Hipster is ready to pay up to \$10 for a mojito, and is willing to pay \$5 for a beer. The Biker is ready to pay up to \$7 for a mojito, and at most \$6 for a beer. Assume that Comedy Cellar has no costs, and nobody wants more than one drink.

**b (3)** *Why would a model with just 1 customer not explain the club's strategy?*

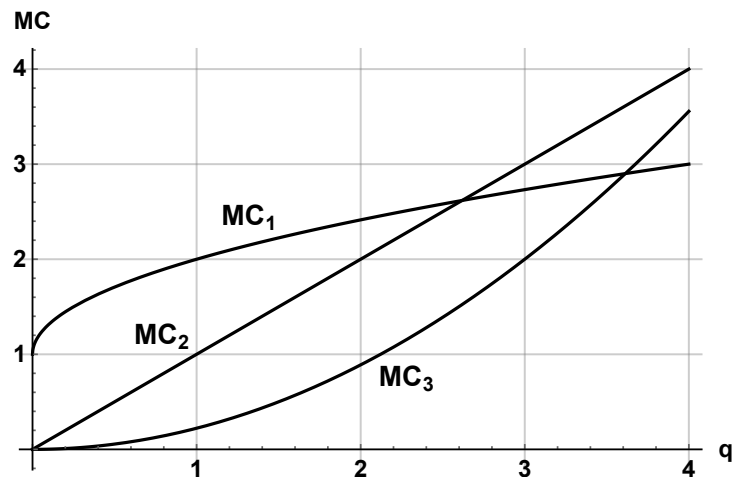
**c (5)** Consider uniform pricing. Find the price of the show  $p_S$ , the price of mojito  $p_M$ , and the price of beer  $p_B$  that the club should set. How much money do they make?

**d (7)** Now analyze the actual strategy of the club. If the ticket comes with an obligation to buy one drink, what would the prices  $p_S$ ,  $p_M$ , and  $p_B$  be? What is the profit? There is more space on the next page.

**e (7)** *Use the differences between (c) and (d) to make a prediction about prices at (real) Comedy Cellar: compared to uniform pricing, prices for what kind of drinks should be higher and why?*

## Math Problems (72 points)

**PROBLEM №2** (12 points) A firm has three factories with different marginal cost functions (see the picture). The firm wants to produce 6 units of output. How should it split the output across the factories?



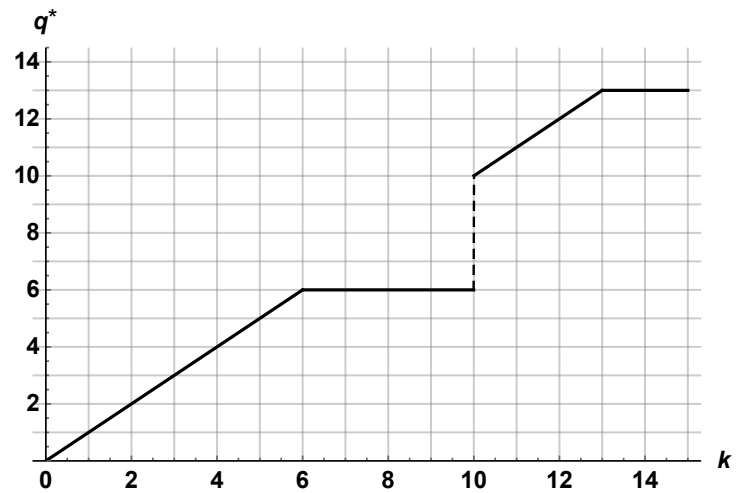
**PROBLEM №3** (12 points) The  $AVC$  function of a firm in a competitive market is given by the expression on the right. Fixed cost is zero, and entry to (and exit from) the market is free.

$$AVC(Q) = \begin{cases} 2 - Q, & Q \leq 1 \\ 2Q - 1 & Q > 1 \end{cases}$$

**a (6)** Find the equilibrium price in this market in the long run, when firms can both enter and exit the market.

**b (6)** Find the supply curve of the firm.

**PROBLEM №4** (12 points) A monopolist is planning to open operations in two geographic markets: NYC and Boston. Both markets have linear demand curves, and marginal cost of production is constant. There are prices at which only customers in NYC are willing to buy the good. To plan the capacity of the factory that will produce for these markets, the economist at the firm came up with the graph that shows the optimal output  $q^*$  of the firm as a function of the capacity  $k$  of the factory. However, the economist was assuming that the good will be sold at the same price in both markets. You, however, were planning to set different prices in NYC and Boston. Assuming that you open a factory with  $k = 14$ , what would the sales be in Boston if you go ahead with your plan?



**PROBLEM №5** (*12 points*) The market consists of two consumers, with valuations of the good given by  $v_1(q_1) = 9q_1 - \frac{1}{2}q_1^2$  and  $v_2(q_2) = 7q_2 - \frac{1}{2}q_2^2$  respectively. The monopolist can perfectly price-discriminate. Find the profit she can achieve if  $MC(q) = q + 2$  (**12 points**), or  $MC(q) = 6$  (**6 points**).



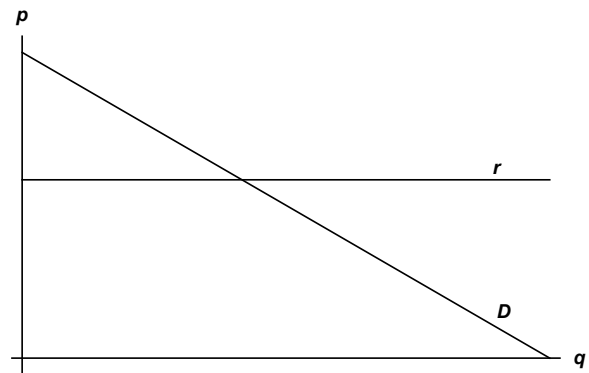
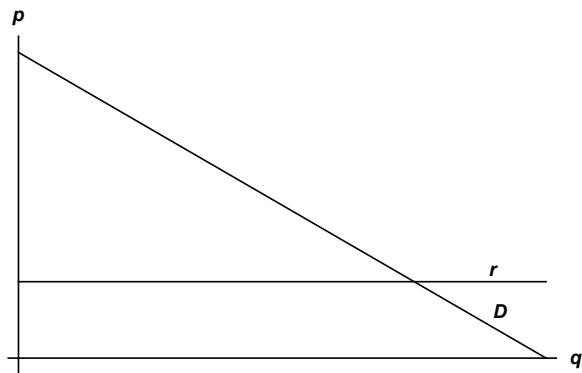
**PROBLEM №6** (*12 points*) You have two pieces of data about the firm. The first six months of the year the firm's patent was still active, and the firm was able to charge monopoly prices to the constantly fluctuating demand. The observed prices and quantities are presented in the left table (ordered for your convenience). Then the patent expired, and the firm became just one of many firms in a competitive market. The data on the market price and the quantity sold by the firm is presented in the right table. Find the elasticity of demand for firm's product in any month before the patent expiration.

$P$	1	2	3	4	5	6
$Q_m$	1	3	5	7	9	11

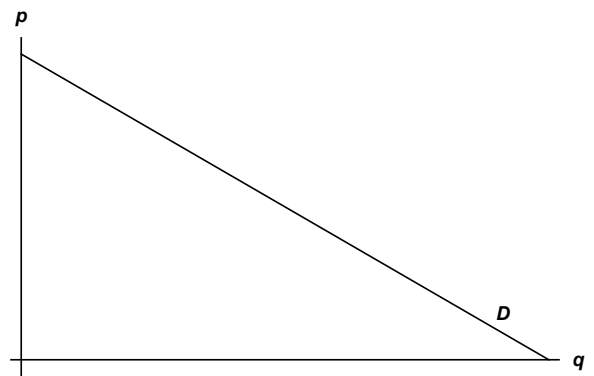
$P$	1	2	3	4	5	6
$Q_c$	2	5	8	10	12	13

**PROBLEM №7** (12 points) “Middle Ground” is the only bar in Elast city. The bar is buying beer from the only retailer of beer in the area at the price of  $\$r$  per liter, and is then selling it in the city. There are no other costs. The demand  $D(p)$  for (liters of) beer in the city is linear. The bar doesn’t price-discriminate.

**a(6)** In the graphs below the bar is facing different wholesale prices  $r$  and the same demand for beer  $D$ . Complete the graphs if you need to, and show the revenue of the beer retailer in those graphs.



**b(6)** Find the price  $r$  that maximizes the revenue of the retailer. If the retailer was selling directly to the customers, would it choose a different price?



**PROBLEM №**\_\_

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