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Last Name (Please PRINT): .....

First Name (PRINT): .....

Your UM I.D. Number: .....

INSTRUCTIONS (please read!)

1. Please make sure that you have 10 pages, including this page. Complaints about missing pages will not be accepted.
2. Please answer all the questions. You are not allowed to use any course material. Calculators are permitted.
3. Maximum Time Allowed: 2 hours (10:30–12:30).
4. Your grade would depend on the arguments you develop for supporting your answers. Each answer must be justified by using a logical argument consisting of a model/graph. An answer with no justification will not be given any credit.
5. You must provide all the derivations leading you to a numerical solution.
6. When you draw a graph, make sure that you label the axes with the appropriate notation.
7. Maximum Score: 100 Points
8. Budget your time. If you cannot answer a certain question, skip to the next one.
9. Please always bear in mind that "somebody" has to read and understand your handwriting. Please make sure that your ink is "visible" and that your sentences are properly organized and fit into the designated blank space. If you think that your handwriting is poor, please print each word!
10. Good Luck !

Instructor's use only

Problem #	1 & 2	3	4	5 & 6	7	8 & 9	10	11	Total
Maximum	10	25	10	15	10	10	10	10	100
Points									

(1) [5 points] Describe the three main classifications of mergers

(2) [5 points] Demonstrate a case in which a *vertical* merger can reduce or even eliminate competition in the market for the final good. Draw a picture explaining graphically what some economists fear may be a consequence of a *vertical* merger.

(3) Aike (Brand A) and Beebok (Brand B) are the leading brand names of fitness shoes. The direct demand functions facing each producer are given by

$$q_A(p_A, p_B) = 180 - 2p_A + p_B \quad \text{and} \quad q_B(p_A, p_B) = 120 - 2p_B + p_A.$$

Note: The demand functions are not symmetric (i.e., they have different intercepts). Assume zero production cost ($c_A = c_B = 0$) and solve the following problems:

(3a) [15 points] Solve for the Nash-Bertrand equilibrium prices, $\langle p_A^b, p_B^b \rangle$. Then, compute the equilibrium output levels $\langle q_A^b, q_B^b \rangle$, the equilibrium profits $\langle \pi_A^b, \pi_B^b \rangle$, and aggregate industry profit $\Pi^b = \pi_A^b + \pi_B^b$.

(3b) [10 points] Suppose now that the two firms merge. However, they decide to keep selling the two brands separately and charge, possibly, different prices. Compute the prices p_A and p_B which maximize joint industry profit, $\pi_A + \pi_B$. Then, compute aggregate industry profit and compare it to the aggregate industry profit made under Bertrand competition which you have already computed under separate ownership.

(4) [10 points] Lazy Labs Inc. conducts medical research on a certain anti-laziness pill. It is estimated that the lifetime value of the patent on this pill would be $V = \$1024$ (in millions). The company can invest in many separate identical labs. Each lab costs $\$16$ million to operate, and each has a probability $\alpha = 0.5$ of discovery. Find the profit-maximizing number of separate labs that the company should be investing in. Prove your result.

(5) [5 points] The European aircraft producer Airbus and the American producer Boeing consider developing a new air-to-air refueling tanker. The table below exhibits the profit levels of Airbus and Boeing under the four possible market outcomes.

		AIRBUS	
		Develop	Don't Develop
BOEING	Develop	2 -10	50 0
	Don't Develop	0 20	0 0

Is there any level of R&D subsidy that the EU government can provide Airbus that would *deter* Boeing from developing this tanker? Prove your answer.

(6) [10 points] The inverse market demand function for vacuum cleaners is given by $p = 120 - 0.5Q$. Initially, firm A and firm B produce at equal unit cost, $c_0 = \$80$. After heavy investment in R&D, firm A has managed to reduce its unit production cost to $c_1 < \$80$. For which values of c_1, firm A's innovation can be classified as drastic (or major), and for which values of c_1 the innovation is classified as minor. Prove your result using the definition.

(7) A monopoly offers a product for sale. The product costs $c = \$60$ to produce. The product may fail with probability 0.5, hence it is fully operative with probability $\rho = 0.5$. This probability is public information in the sense that it is known to the seller and all buyers.

The product can either be fully functioning or totally defective. Consumers are willing to pay up to $V = \$240$ for a fully-functioning product. If the product is found to be defective, consumers do not gain any utility. Solve the following problems.

(7a) [5 points] The monopoly provides a "twice-replacement" warranty. That is, if the original purchase is found to be defective, the consumer can have the product replaced free of charge. If the replacement product is also found to be defective, it also gets replaced free of charged. However, the monopoly will not replace the replacement of the replacement product if it also found to be defective. Compute monopoly's profit-maximizing price and the resulting expected profit.

(7b) [5 points] Now suppose the monopoly provides a money-back guarantee (instead of the twice-replacement warranty). Compute monopoly's profit-maximizing price and the resulting expected profit.

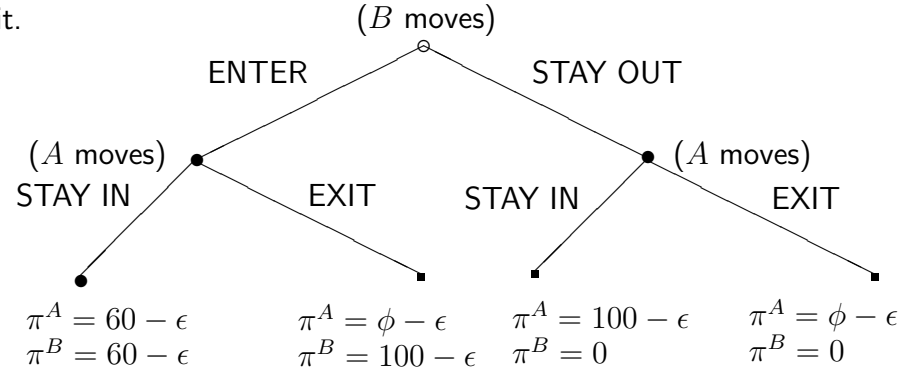
(8) [5 points] From your reading of patent law and class discussion, list the four types of patents on inventions that can be granted. Also, list the three requirements in order for an innovation to be qualified for a patent.

(9) [5 points] A monopoly selling internet services spends 20% of its sales revenue on persuasive advertising. The price elasticity is $\epsilon_p = -2$. Using the Dorfman-Steiner condition, determine what is the advertising elasticity of demand in this market.

(10) [10 points] Congratulations, you have been appointed the CEO of LUFTMAMA Airlines. The passengers' inverse demand functions facing LUFTMAMA during summer and winter are $p_S = 12 - q_S/2$ and $p_W = 24 - 2q_W$, respectively. There are no fixed costs, but the marginal capacity cost is $r = \$3$ and the marginal operating costs is $c = \$4$.

Compute the summer and winter airfares (and the resulting profit over a cycle of two seasons) assuming that LUFTMAMA implements a peak-load pricing structure.

(11) Consider the entry-exit two-stage game in which firm A is the incumbent firm that faces a potential entrant firm B. In stage I, firm B decides whether to enter into A's market or whether to stay out. The cost of entry is denoted by ϵ. In stage II, the established firm, firm A, decides whether to stay in the market or exit.



The game tree reveals that firm A can recover some of its sunk entry cost by selling its capital for the price ϕ, where $0 \leq \phi \leq \epsilon$. Solve the two problems on the next page:

(11a) [5 points] Compute the subgame-perfect equilibrium strategies of firms B and A assuming that $\epsilon < 60$. Prove your answer.

(11b) [5 points] Answer the above assuming that $60 < \phi \leq \epsilon < 100$.

THE END