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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 8 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

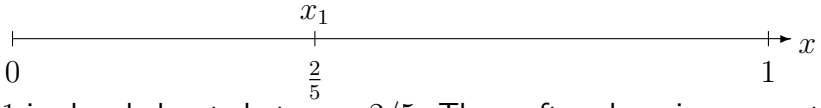
Problem #	1	2 & 3	4	5 & 6	7 & 8	9	Total
Maximum	15	20	15	20	15	15	100
Points							

(1) The inverse demand functions for orange juice (O) and grape juice (G) are given by: $q_O = 24 - 2p_O + p_G$ and $q_G = 12 - 2p_G + p_O$, where p_O and p_G denote the price of orange juice and grape juice, respectively. JUICIANA company is the sole producer and seller of both orange and grape juice. JUICIANA has no cost of production ($c_O = c_G = 0$), and maximizes the monopoly profit from selling in both markets, $\Pi = \pi_O + \pi_G$.

(1a) [5 points] Suppose that JUICIANA is restricted to setting a single uniform price for all juices, so that $p = p_O = p_G$. Compute JUICIANA's profit-maximizing price p, quantities sold q_O and q_G, and the resulting profit.

(1b) [10 points] Answer the above question assuming that JUICIANA is now free set different prices $p_O \neq p_G$ for the juices it sells. Which pricing policy (uniform versus nonuniform) yields a higher profit?

(2) [10 points] Consider sequential entry of restaurants to the linear city which is the interval $[0, 1]$. Consumers are uniformly distributed on the linear street with one consumer at every point x ($0 \leq x \leq 1$). All restaurants charge the same price, so consumers go the restaurant closest to their location. Restaurants choose their location to maximize the number of customers.



Suppose restaurant 1 is already located at $x_1 = 2/5$. Then, after observing x_1, restaurant 2 chooses its location x_2, and only then restaurant 3 chooses x_3 after observing x_1 and x_2. Solve for the subgame-perfect equilibrium locations of restaurants 2 and 3, x_2 and $x_3(x_2)$ and the restaurants' profit levels (number of customers). Make sure clearly specify the best-response function of restaurant 3.

(3) [10 points] The inverse market demand function for MP3 players is given by $p = 240 - 2Q$. Initially, firm A and firm B produce at equal unit cost, c_0. After investing heavily in R&D, firm A has managed to reduce its unit production cost to $c_1 = \$40 < c_0$. For which values of c_0, firm A's innovation can be classified as drastic (major), and for which values of c_0 the innovation is classified as nondrastic (minor). Prove your result using the definition.

(4) [15 points] The inverse demand functions for orange juice (O) and tomato juice (T) are given by

$$q_O = 240 - 2p_O + p_T, \quad \text{and} \quad q_T = 120 - 2p_T + p_O.$$

where p_O and p_T denote the price of orange juice and tomato juice, respectively. The cost of producing one unit of orange juice or tomato juice, is the same and given by $c_O = c_T = 60$.

Assume that the ORANGADA company is the sole producer and seller of orange juice, and that the following market prices are observed: $p_O = 120$ and $p_T = 80$.

Use the SSNIP test to determine which of the following markets should be considered as the "relevant market" for the ORANGADA company: (i) Orange juice only, (ii) Orange and tomatoe juice, (iii) broader market (more juices should be included).

(5) Two separate labs consider engaging in R&D for developing an anti-laziness pill (intended to used mainly by students). The value of the patent on this pill is estimated to be $V = \$240$. If two labs discover the patent, the firms equally share the prize so each earns $240/2 = \$120$.

Lab A: Cost of the lab is $I_A = \$40$, probability of discovery is $1/4$.

Lab B: Cost of the lab is $I_B = \$60$, probability of discovery is $1/3$.

(5a) [5 points] Compute the equilibrium number of labs which enter the R&D race.

(5b) [5 points] Suppose that both labs are now under a single ownership (or have been nationalized by the local government). Which lab(s) will be operated under this joint ownership?

(6) [10 points] From your reading of patent law and class discussion, list the <u>four</u> types of patents on inventions that can be granted. Also, list the <u>three</u> requirements in order for an innovation to be qualified for a patent

(7) [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.

(8) 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.

(8a) [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.

(8b) [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.

(9) The inverse market demand for TOASTER-PHONEs in NYC is $p = 36 - Q$. The manufacturer licenses a single dealer to sell this brand in NYC. Therefore, the dealer acts as a monopoly in the NYC market. The manufacturer sells each TOASTER-PHONE to the dealer for $\$d \geq c$, where $c = \$20$ is the cost of producing one TOASTER-PHONE. In addition, the manufacturer may levy a fixed fee of $\$\phi$ on the dealership.

Consider a two-stage game in which in Stage I the manufacturer sets the per-unit price charged to the dealer d, and the fixed fee ϕ. In Stage II the dealer determines the quantity sold as to maximize the dealership's profit.

(9a) [5 points] Compute the dealer's price p, quantity sold Q, and profit π^d as a function of d and ϕ.

(9b) [5 points] Suppose the manufacturer does not charge the dealer any fixed fee, $\phi = 0$. Compute the dealer's price d which maximizes the manufacturer's profit. Then, compute the equilibrium consumer price p, and the profits made by the manufacturer π^m and the dealer π^d.

(9c) [5 points] Can the manufacturer set a different contract with the dealer so that both, the manufacturer and the dealer, make higher profits. Formally, find d and ϕ which would generate higher profit levels, π^m and π^d, compared to the levels you computed in (9b).

THE END