Economics 121: FINAL EXAM

<u>GENERAL INSTRUCTIONS</u>: Write your name on the front of each blue book that you use. Please write clearly. The exam has four parts with some choice. All together there are 200 points. Point assignments are given in the instructions for each part.

- I. <u>TRUE or FALSE or UNCERTAIN and EXPLAIN</u>: Choose <u>4 of the following 5</u> statements, decide whether each is true or false or uncertain, and then explain the reasoning behind your answer. Each is worth 12 points for a total of 48 for this part.
- 1. "Learning by doing" gives rise to a scale economy in the production of a single product.
- 2. A potential entrant may find it profitable to enter a Cournot oligopoly even when it has <u>higher</u> marginal cost than <u>all</u> incumbent firms.
- 3. Suppose that N firms are located along the Hotelling line and compete on price as usual. If two of those firms merge, then the profit of each of the N 2 non-merging firms will <u>rise</u>.
- 4. It would not be profitable for Microsoft to require PC makers like Dell Computer to purchase all of their pointing devices (computer mice and track balls) from Microsoft because the product market for pointing devices is highly competitive.
- 5. We the U.S. government to succeed in forcing the Bayer to sell its patented, anti-Anthrax drug, Cipro, at production cost, society would be better off because the increase in consumer welfare would far outweigh reduced profits of Bayer.

II. <u>SHORT ANSWER</u>: Choose <u>one of the following two questions</u>, and answer its various subparts *briefly*. Either question is worth 30 points.

- 1. Consider the standard Dixit model of strategic entry deterrence: a single incumbent, threatened by a single potential entrant facing fixed costs, makes irreversible investment in capacity, with the two firms engaging in quantity competition should entry occur.
 - a) **[5]** Inscribe the best response curve of the potential entrant in a diagram representing the quantity choices of the two firms, and indicate the entrant's breakeven quantity with a "B."
 - b) **[5]** Using this same quantity diagram, plot the best response curve of the incumbent for a given level of capacity investment.
 - c) [5] Starting with a new quantity diagram, carefully depict the Stackelberg equilibrium (denoted by "S").
 - d) [7] Using a separate quantity diagram, illustrate the case of "blockaded entry."
 - e) [8] Using yet another quantity diagram, illustrate the case of "ineffectively impeded entry."
- 2. Consider a game between an "incumbent" and an "entrant" where the entrant decides whether to "enter" or "stay out," and the incumbent decides whether to "fight" (e.g., launch a price war) or to "accommodate." The payoff matrix is given by:

	Entrant				
ncumbent			Enter Stay Out		Stay Out
	Fight		- 1		0
	_	-1		10	
	Accommodate		3		0
Ir		3		10	

- a) **[5]** Give a brief but precise definition of "dominant strategy" and identify any and all dominant strategies that either firm has.
- b) **[5]** Give a definition of Nash equilibrium, and find all pure-strategy Nash Equilibria for this matrix game when players move simultaneously.
- c) [5] Draw the extensive form of this same game when the entrant moves first and the incumbent moves second. Be sure to label everything in your diagram.
- **d**) **[7]** Suppose that the incumbent operates in 10 different markets, and that each of 10 potential entrants contemplate entering those markets one at a time. How, if at all, would the incumbent's strategy change? Explain.
- e) [8] Describe how the equilibrium would change if there is a reasonably high chance that the incumbent actually prefers to "fight", i.e., it gives a higher profit than "accommodate" even if entry occurs?

III. <u>MULTI-PART QUESTIONS</u>: Answer <u>all parts</u> of both of the following two multipart questions. The point assignment for each subpart is given in [square brackets].

- 1. A home video game maker, Sontendo, manufacturers a proprietary game console called the "PlayCube" and also develops the game software used with its console. Consumers have other home video game systems to choose from besides the PlayCube.
 - a) [7] Define the concept of a "network externality" concisely, and then describe how it could arise with the purchase and use of the PlayCube game console and software.
 - b) [6] Describe market conditions under which Sontendo might *profitably* sell the consoles below the cost of producing them.
 - c) [7] Why would Sontendo give subsidies to makers of video games that operate with the PlayCube, or otherwise facilitate the development of compatible software?
 - d) [10] In contrast, give reasons why might Sontendo also prevent independent software makers from writing games that work on its PlayCube (possibly filing lawsuits for copyright violations) that would promote economic efficiency and exercise market power.

- 2. High Definition Televisions (HDTVs) are composed of one tuner and one display screen. Suppose that Hitachi (firm 1) has a patent monopoly on the screen and Sony (firm 2) has one on the tuner. Of course, viewers are interested only in the complete system composed of one each. Let demand for HDTV systems be given by: $D(p_1 + p_2) = 2 (p_1 + p_2)/2$ measured in billions of systems purchased per year, where p_1 and p_2 are the prices for a console charged by Hitachi and Sony, respectively, for the tuner and screen. Assuming that the two companies only incur fixed costs, and those fixed costs are already sunk, they both have zero marginal cost.
 - a) [7] Show that Hitachi's best response function of Sony's 2 price is: $p_1 = r_1(p_2) = 2 (p_2/2)$.
 - b) [8] Find the Nash equilibrium in the two prices, along with the implied equilibrium price of a system and the equilibrium quantity sold.
 - c) [7] For comparison, compute the joint profit-maximizing price for HDTV systems, and the associated profits of the two firms.
 - d) [6] How might the two companies eliminate the private and social losses of this outcome without merging?

Now suppose that the two firms set price an <u>infinite number of times</u>. They discount profits earned in the future by the same discount factor d where 0 < d < 1.

- e) [7] Write down an expression for a "trigger strategy" that each firm could follow to sustain the joint profit-maximizing pricing found in (c).
- f) [9] Solve for a condition on d that ensures that the trigger strategies form a subgame perfect Nash equilibrium. Show your work.

IV. <u>INDUSTRY STUDIES</u>: Answer each of the following 3 questions. For each one, select just <u>ONE of the THREE industries</u> that are listed below the question, and then answer the question for <u>that industry only</u>. Each of the three is worth 16 points for a total of 48 points.

- 1. Briefly define HHI, and give reasons why the HHI for the chosen industry would be a poor predictor of its performance even if the economic product market were properly defined.
 - a) Breakfast cereals b) Personal computers software c) Pharmaceuticals
- 2. Describe one case of significant <u>new entry</u> that has occurred during the history of the chosen industry, and then address: (1) the economic <u>cause</u> for this entry, and (2) its principal <u>effect</u> on equilibrium in the industry.
 - a) Beer b) Personal computers software c) Pharmaceuticals
- 3. Describe the extent of <u>vertical integration</u> in the chosen industry and give two reasons why it could be efficient.
 - a) Steel b) Personal computers software c) Pharmaceuticals