**Department of Economics** **Fall 2003**
**University of California** **Prof. Woroch**

***Economics 121:* FINAL EXAM**

**GENERAL INSTRUCTIONS: 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 100 points. Point assignments are given in the instructions for each part.**

**I. TRUE or FALSE or UNCERTAIN and EXPLAIN: Choose 7 of the following 10 statements, decide whether each is true or false or uncertain, and then explain the reasoning behind your answer. *Be sure to state assumptions you need to arrive at your conclusion.* Each is worth 4 points for a total of 28 for this part.**

1. Suppose all firms in an industry produce using a cost subadditive technology. Then, if they were to form a cartel, only one of the members would produce and all others would shut down.
2. The Lerner Index decreases as the number of firms increase in a Cournot oligopoly.
3. According to the Stackelberg model, the leader produces more and earns more profit than the follower because it is a price setter and the follower is a price taker.
4. If two firms located on Hotelling's Main Street charge different prices, and those prices are fixed, then the low-price firm will have an incentive to move toward the high-price firm.
5. When firms sell the same product in each of an infinite number of periods, a cartel is more likely to succeed in maintaining the collusive outcome, all else equal, when its members compete according to Cournot quantity competition, rather than Bertrand price competition.
6. The "merger paradox" may not occur when the products of merging and non-merging firms are differentiated.
7. Predatory pricing is not likely to be a profit-maximizing strategy when the targeted firms have large sunk costs.
8. In the "chain store paradox," potential entrants in the separate markets choose not to enter because the chain store threat in one market makes its threat credible in all other markets.
9. When a firm has monopoly over a product, tying a second product to the sale of that good may not increase its profit.
10. A firm in a perfectly-competitive industry may have a smaller incentive to invest in a cost-reducing innovation than a monopolist when that innovation is "drastic."

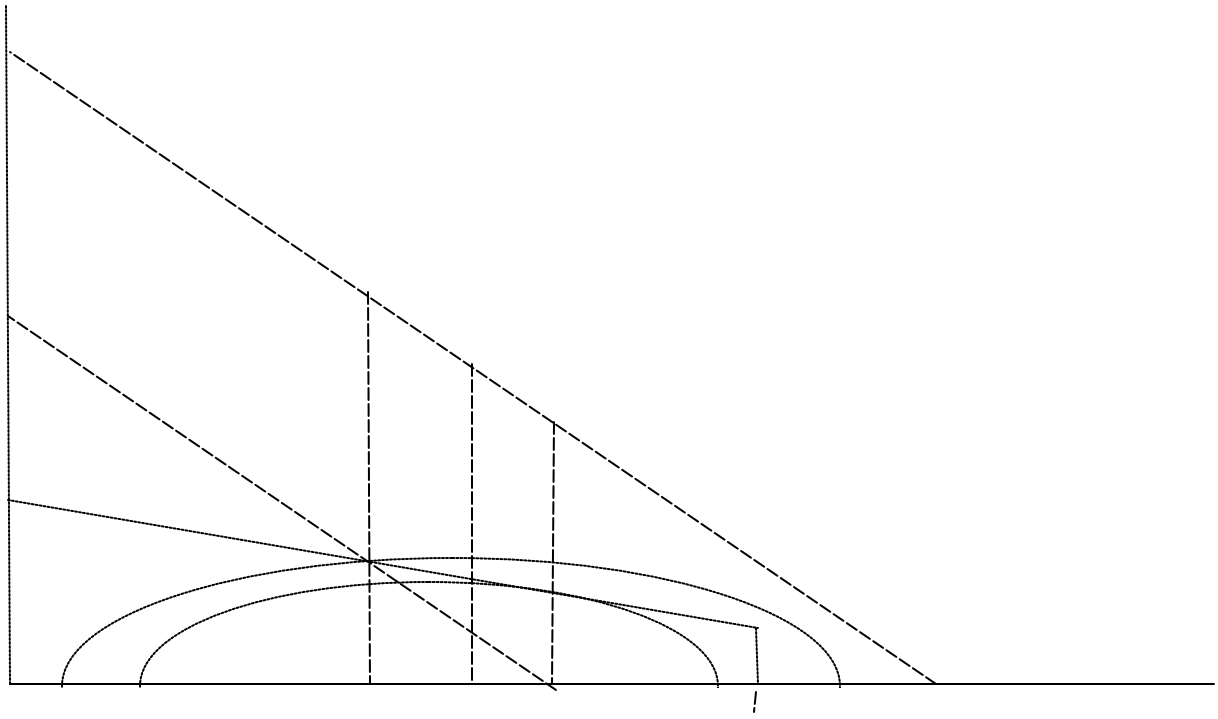
**II. MULTI-PART QUESTIONS: Answer all the subparts of each of the following four multi-part questions. The point assignment for each subpart is given in [square brackets].**

1. In the mainframe computer industry of the 1970s, IBM was the dominant supplier but it did face entry threats. To examine its behavior toward competitors, suppose that IBM produces $q_1$ and it incurs a cost of $c_1(q_1) = 6\,q_1$ measured in hundreds of thousands of dollars. IBM faces potential entry by Fujitsu, the Japanese mainframe maker. Fujitsu produces a computer that is a perfect substitute for the IBM machine but its production costs are: $c_2(q_2) = 100 + 12\,q_2$ where $q_2$ is Fujitsu's production level and costs are measured in hundreds of thousands of dollars. Inverse demand for mainframes is given by $p(Q) = 120 - Q$, where $Q = q_1 + q_2$ is the total production by IBM and Fujitsu, and again price is measured in hundreds of thousands of dollars. Initially suppose that the incumbent, IBM can credibly commit to a quantity to produce, after which Fujitsu will choose its own quantity.

   a) **[3]** Find Fujitsu's reaction function.
   b) **[3]** If IBM accommodates entry, find IBM's profit-maximizing quantity and its resulting profits. Alternatively, IBM can attempt to deter entry by Fujitsu by engaging in "limit pricing." In fact, it would set a quantity so that Fujitsu would not be able to make a profit.
   c) **[4]** If IBM produces to limit Fujitsu's entry, verify that $q_1 = 88$ is the quantity that results in the limit price, and find that price and IBM's associated profit.
   d) **[4]** Will IBM prefer to deter entry or accommodate entry? Prove it.

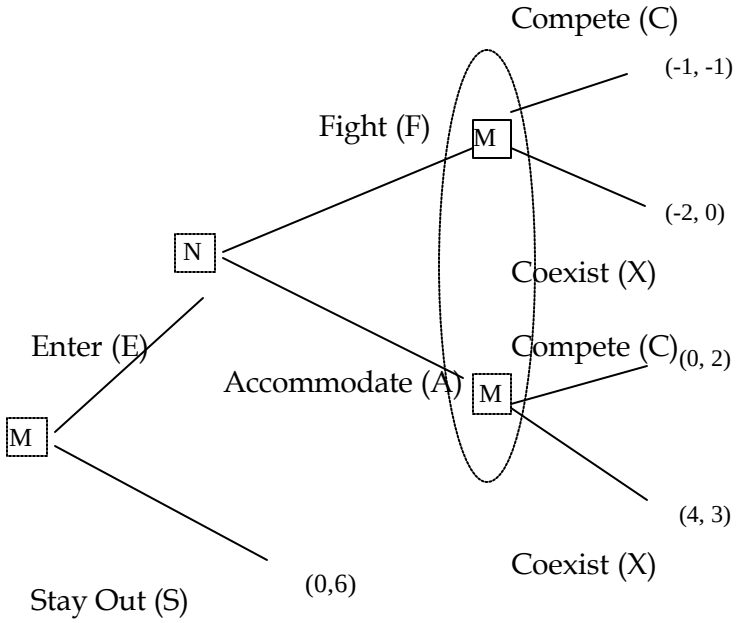
2. Suppose the production of automobiles in a small country follows the model of "successive monopolies," with a monopoly engine manufacturer that delivers engines to a monopoly assembler of the finished automobile.
   a) **[4]** Describe the phenomena of "double marginalization" in the context of this auto industry and be sure to identify its causes and list its economic consequences.
   b) **[4]** If the two monopolies merge, will they be more profitable? Will consumers be harmed?
   c) **[4]** Describe two vertical restraints the upstream engine maker might impose on the downstream assembler to avoid the problem of double marginalization without needing to merge.

3. Intel and AMD compete as duopolists in the semiconductor market. It is reasonable to expect that, given its size and history, Intel assumes the role of industry leader. In that role, Intel invests in capacity by building fabrication ("fab") plants in advance of its competitors' entry into each product market. Let $k_I$ be the amount of sunk productive capacity of Intel's fab plant built before AMD enters. Ex ante, both firms have the same costs. After investment in capacity, the firms compete by choosing quantities simultaneously. The diagram below gives both firms' best responses along with some of Intel profit contours. Answer each question, referring to the letter label(s) in the diagram where necessary.
   a) **[2]** The equilibrium outcome when Intel makes no capacity investment.
   b) **[2]** Intel's best-response curve, when it invests in capacity $k_I$.
   c) **[2]** The limit quantity, $q_I^L$, that deters AMD from entering the market
   d) **[2]** Intel's optimal capacity choice
   e) **[2]** Equilibrium outputs predicted by the Dixit model.



4. Turn back the clock to 1995 when Netscape (N) was effectively the incumbent monopolist in the market for Internet browsers. Soon afterwards, Microsoft (M) considered entering this market. Imagine that the two firms found themselves engaged in the extensive-form game given below. The first number in brackets is the profit payoff to Microsoft, the second to Netscape. Note that, if it enters, Microsoft does not observe whether Netscape responds by choosing to "fight" or to "accommodate."

a) **[3]** Identify the subgame following Microsoft's decision to enter and represent that subgame in strategic/matrix form.
b) **[2]** Identify any dominant strategies that either or both players have in the strategic/matrix game constructed in part (a).
c) **[2]** Identify any and all Nash equilibria (in pure strategies) for the subgame.
d) **[2]** Find the (subgame perfect) Nash equilibrium of the complete game.
e) **[3]** Would the equilibrium change if Netscape could commit to play "Fight" regardless of whether Microsoft chose "Enter" or "Stay Out"? Is this a reasonable equilibrium if Netscape cannot commit? Explain.




**III. <u>INDUSTRY STUDIES:</u> Answer each of the following 3 questions. For each one, select <u>just 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 8 points for a total of 24 points.**

1. Choose one of the three industries below and briefly describe the pattern of <u>horizontal mergers</u> over time *and* how it affected the current level of <u>concentration</u> in the industry.
   a) Cereals b) Microcomputer software c) Pharmaceuticals

2. Choose one of the three industries below and describe <u>one exclusionary practice</u> used by incumbent firms in the industry at some time. Explain how this practice could improve efficiency *and also* how the practice could harm competition in the two selected industries.
   a) Beer b) Microcomputer software c) Pharmaceuticals

3. Choose one of the three industries below and describe one <u>product or process innovation</u> that has occurred in the industry *and* describe the structural change that caused.
   a) Autos b) Microcomputer software c) Pharmaceuticals

**IV. <u>EXTRA CREDIT:</u> Each student was assigned a discussion question for discussion of one of the five industry studies. <u>State clearly the question</u> you were assigned and give your answer to the question in a few sentences. Your answer will add up to 4 points to your score.**