

100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (10 pts.) Briefly explain reasons why a firm might find it advantageous to vertically integrate upstream (Make) rather than acquire an input via market transactions (Buy).

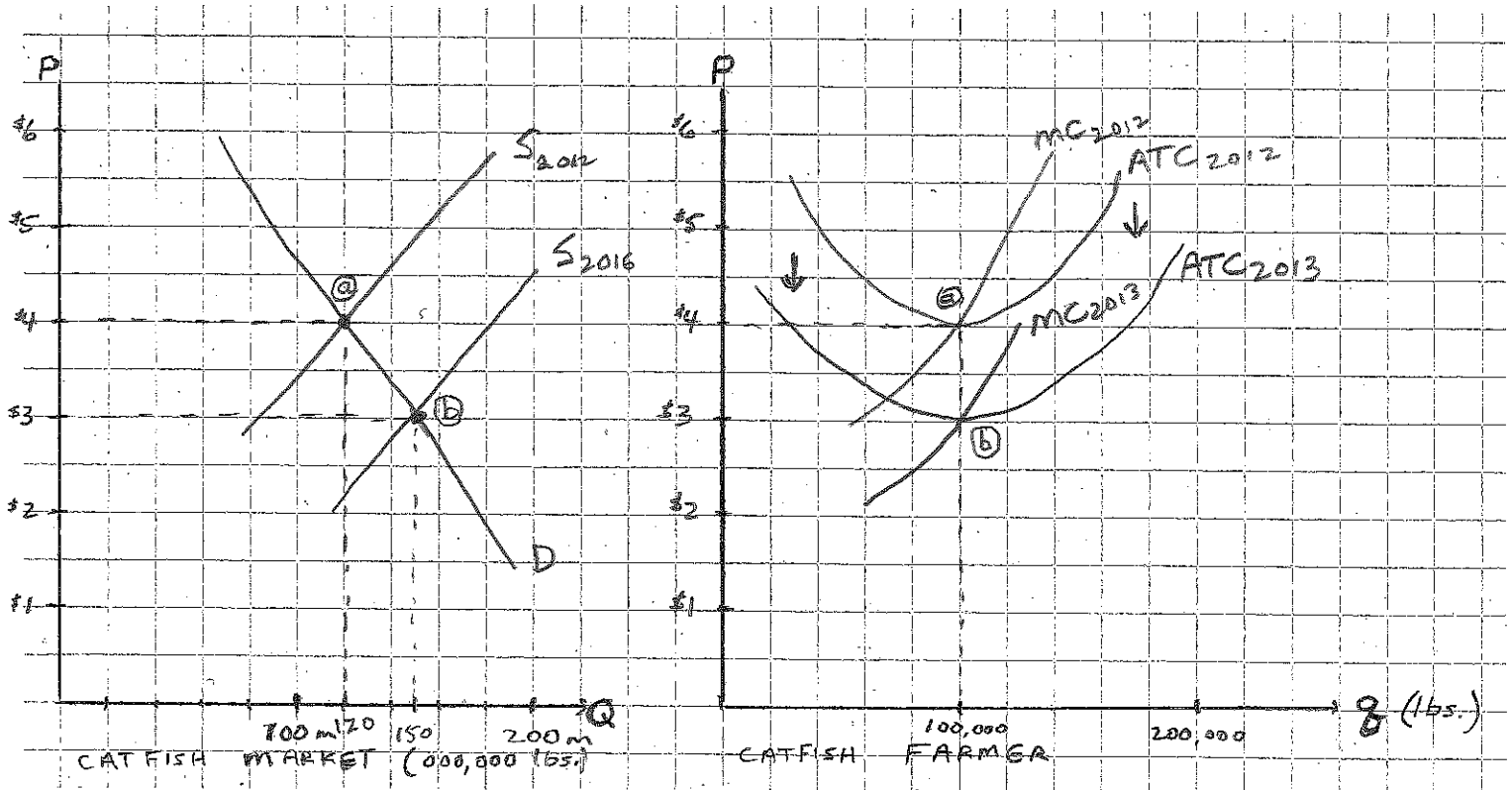
- Production efficiencies: in some production processes, there are physical production efficiencies that make cheek-to-jowl production (with accompanying joint ownership) more efficient.
- Extensive coordination: when a number of complex, interrelated processes are involved in producing a product, it is sometimes efficient to combine them and put them under the direction of one organization.
- Information asymmetry: If the upstream supplier of an input has more information about the quality of an input than the downstream buyer who uses the input in its production process, the buyer is susceptible to exploitation. The input supplier may exploit the buyer by supplying a lower quality product than the buyer was expecting. Vertical integration is one way to eliminate the incentive of the upstream seller to chisel on quality.
- Reputation externalities: Some products involve centralized development of a process, business format, or product, and development and maintenance of the associated brand-name capital. Production and delivery of the product to customers will be decentralized if customers are spread through geographic space. The value of the brand name will depend on customers' perception of the quality of their consumption experience. If customers who have a bad experience at one location associate bad quality with the entire chain, there are what we call reputation externalities.
- Specialized assets: refer to inputs that have significant productivity in a particular use, but little or no value outside of that use. The investment in that asset, once undertaken, is irreversible and so the cost is a sunk cost. The problem with specialized assets is that the owner of the specialized asset is subject to hold-up, and hence will be reluctant to make the investment in the first place. One solution is vertical integration.

2. (5 pts.) In "Haven't Shareholders Had Enough Chicken," what two companies were involved?

Boeing and Airbus - market for super-jumbo jets and whether Boeing would develop its own "answer" to the A-380.

3. (25 pts.) It is 2012. You serve as a business consultant to Cracker Barrel Restaurants. One of the biggest-selling items on their menu is fried catfish fillets. Catfish farmers currently sell catfish at \$4.00 per pound, and 120 million pounds of catfish are transacted in the U.S. Assume that the market is in long-run equilibrium at that price and output. The typical catfish farmer produces 100,000 pounds of catfish annually.

a) Illustrate the 2012 situation in the diagrams below, using D, S, ATC, MC, and d curves. Roughly how many catfish farmers will exist in this market?



b) One of the biggest expenses in raising catfish is feed. Catfish eat pellets that are a combination of corn, soybeans, and wheat. After years of elevated grain prices, corn, soybean, and wheat prices fall sharply in 2013, reducing the cost of raising catfish by 25%. MES is not affected by this fall in input prices. Explain and illustrate in your diagrams what will happen in the market for catfish. If own-price elasticity of demand for catfish is 1.0, what will happen to market output and the number of catfish farmers?

- (a) See diagram, labeled (a) for market and firm outcomes. Catfish farmers earn zero economic profits producing 100,000 pounds annually selling at \$4 per lb. Roughly 1200 catfish farmers in this market: $(1,200,000 \text{ lbs.}) / (100,000 \text{ lbs./farmer})$
- (b) ATC and MC of typical farmer shift downward by 25%, still bottoming out at $q=100,000$ lbs. Catfish farmers earn short-run economic profits until market price adjusts. Profits attract new entrants into the industry, shifting market supply to the right. New long-run equilibrium will occur at $P = \$3/\text{lb}$. Since own-price elasticity = 1.0, a 25% drop in price will lead to a 25% increase in market quantity, or 1.5 million lbs. If MES has not changed, then there will be approximately 1500 catfish farmers in the new equilibrium.

4. (5 pts.) What are the characteristics of the market for charter yachts in Greece? What type of market structure is it?

"If you want to test the same waters that Odysseus wandered, there are plenty of ways. Some 4,000 yachts for charter are registered in Greece, according to the Hellenic Yacht Brokers' Association. For €1,800 to €5,000 (\$2,168 to 6,023) a week, you can hire a simple, "bareboat" miniyacht, 10 to 15 meters long, that you captain yourself. (Ahoy: licensed sailors only.) Or you can charter a crewed, full-service yacht, 18 to 60 meters long (or longer), on which you can sit aft-deck, sip a glass of champagne in the pool or hot tub, and just enjoy the ride. This type of charter can run anywhere from around €8,500 to €250,000 per week -- frequently excluding taxes, food and fuel." *WSJ*, 6/30/04.

Many small independent producers, differentiated product, insignificant entry barriers:
Monopolistic Competition.

5. (5 pts.) Market shares for breakfast cereal manufacturers are as follows: Kellogg's 34%, General Mills 31%, Kraft 14%, Private label brands 10%, Quaker 7%, and other brands 4%. Calculate the HHI for this industry. In your calculation you should count "private label brands" as one company and "other brands" as one company.

$HHI = \sum_{i=1}^n s_i^2$, where s_i represents the market share of the i^{th} firm.

$$(34)^2 + (31)^2 + (14)^2 + (10)^2 + (7)^2 + (4)^2 = 2478.$$

6. (5 pts.) In 2015 Pfizer was days away from publicly announcing the price of its new drug Ibrance. It got a surprise. A competitor raised the monthly cost of a rival treatment by \$1000. What was Pfizer's response? What illness/malady does Ibrance treat?

The staff felt they finally had it. When they met in November 2014 to nail down a price, they picked a figure just below the cutoff: \$9,850 a month. This would be the list price, from which health insurers and pharmacy-benefit managers would negotiate discounts and rebates with Pfizer. The staffers just needed a green light from Dr. Bourla, the executive overseeing cancer drugs.

The price they had picked was well below the cost of treatment involving one of the three benchmark drugs Pfizer had identified. But it was close to the price of the other two, and slightly above the price of the most direct competitor, Novartis's Afinitor.

Then, on Jan. 6, 2015, Novartis raised Afinitor's price 9.9%. Novartis says it adjusts prices to reflect "an evolving health-care and competitive environment," new evidence and the need to support R&D.

The new price for the close rival drug put its monthly price \$687 above what Pfizer was planning to charge. Meeting in Dr. Bourla's New York office three days later, Pfizer staff members mentioned that price increase. Dr. Bourla asked if Pfizer, too, should go higher.

"This may make some plans just not use it, and some will make things difficult and that will frustrate patients," he recalls being told.

Alternatively, Dr. Bourla asked, should Pfizer charge a lower price than it was planning? Would doing so reach substantially more patients? He says staffers told him that a price closer to \$9,000 a month wouldn't improve health-plan coverage, and Pfizer would be leaving money on the table. They were back to \$9,850. "Let's go with that," Dr. Bourla said.

"Days before Pfizer Inc. was to set the price for a new breast-cancer drug called Ibrance, it got a surprise: A competitor raised the monthly cost of a rival treatment by nearly a thousand dollars."

100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (5 pts.) What are the characteristics of the market for charter yachts in Greece? What type of market structure is it?

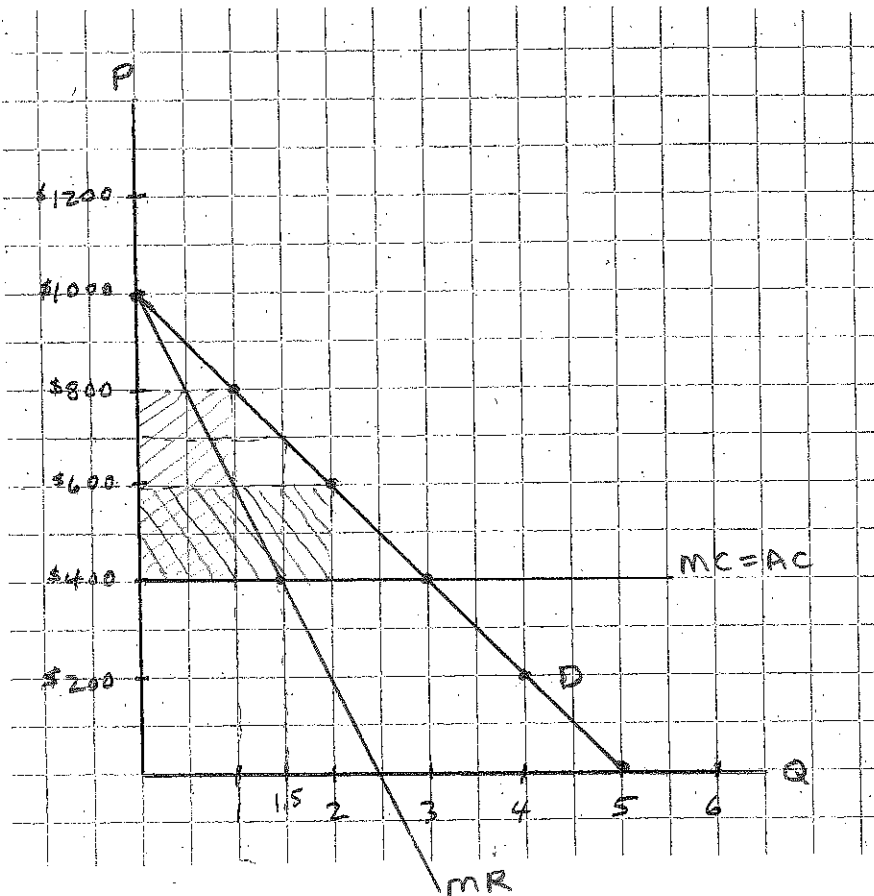
2. (5 pts.) Market shares for automobile manufacturers in the U.S. are as follows: GM 18%, Ford 15%, Toyota 15%, Chrysler 12%, Honda 10%, Nissan 8%, Hyundai/Kia 8%, Volkswagen 4% and other brands 8%. Calculate the HHI for this industry. In your calculation you should count "other brands" as one company.

$HHI = \sum_{i=1}^n s_i^2$, where s_i represents the market share of the i^{th} firm.

$$(18)^2 + (15)^2 + (15)^2 + (12)^2 + (10)^2 + (8)^2 + (8)^2 + (4)^2 + (8)^2 = 1226.$$

3. (5 pts.) In 2015 Pfizer was days away from publicly announcing the price of its new drug Ibrance. It got a surprise. A competitor raised the monthly cost of a rival treatment by \$1000. What was Pfizer's response? What illness/malady does Ibrance treat?

7. (15 pts.) You own and operate the only upscale men's clothing store in town. As such, you have something of a monopoly on expensive men's suits. The demand curve of a typical customer is given by $Q = 5 - P/200$, where Q is quantity demanded and P is the price of a suit in dollars. Your cost function is a simple one, $MC = AC = \$400$ per suit.
- a) If you use a simple uniform price strategy, what P and what Q will maximize your profits? What will profits be? Illustrate in the diagram below.



$MR = MC$ at $Q = 1.5$.
But you can't sell 1.5 suits.

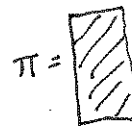
If $Q = 1$, $P = \$800$,
and $\pi = \$400$.

If $Q = 2$, $P = \$600$,
and $\pi = \$400$.

So choose $P = \$800$
or $P = \$600$, makes
no difference in π .

$P = \$800$:

$P = \$600$:



- b) Sometimes you wonder if you are gouging your customers as much as is possible, given your unique market position. When shopping one Saturday morning at the local farmers' market, you observe that the only farmer who has fresh cantaloupes uses the following pricing policy: buy one cantaloupe at the regular price and get the second one for $x\%$ off. You are inspired to revamp your pricing strategy. How would you set the "regular" price and what would the optimal x be for you, given your customers' demand for men's suits? What would your profits be? Illustrate in your diagram.

Set "regular" price at $P = \$800$ (or $\$799.99$)

Offer second suit at 25% off,
or $P = \$600$.

Profit on 1st suit = $\$400$, and profit
on 2nd suit = $\$200$, for total
profit of $\$600$.

8. (15 pts.) Consider the following two-player game. The strategy options and payoffs for the row and column players are contained in the payoff matrix below:

	C1	C2	C3	C4
R1	10, 7	8, 8	0, 6	2, 6
R2	6, 5	2, 3	5, 1	7, 4
R3	0, 4	5, 8	3, 7	5, 10
R4	4, 6	9, 8	6, 9	1, 1

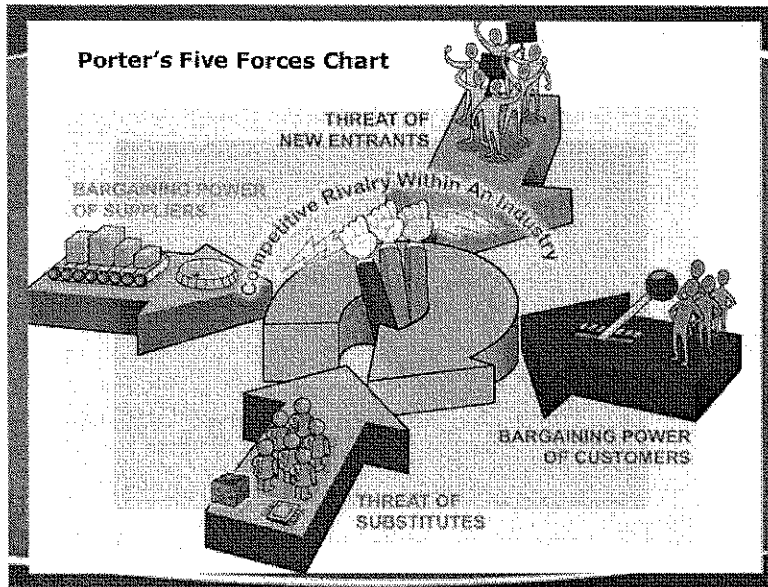
Using the solution strategies we studied in class (dominant strategies, dominated strategies, rationalizable strategies), find the Nash equilibrium. Explain the sequence of reasoning that you use to arrive at your answer.

- (1) The row player will never choose R3, because it is never a best-response to any strategy chosen by the column player. Eliminate R3 from consideration.
- (2) If the row player eliminates R3, then the column player will never play C4, because it is dominated by C1. Eliminate C4 from consideration.
- (3) If the column player eliminates C4, then the row player will never play R2, because it is never a best response to any remaining strategy that might be chosen by the column player. Eliminate R2 from consideration.
- (4) If the row player eliminates R2, then the column player will never play C1, because it is dominated by C2 among the strategies that the row player might consider playing. Eliminate C1 from consideration.

In the remaining 2 X 2 payoff matrix (consisting of row player strategies R1 and R4 and column player strategies C2 and C3), the row player has a dominant strategy of R4, which suggests to the column player that she should play C3.

R4 and C3 are a Nash equilibrium in that R4 is the best response that the row player can make given that the column player chooses C3, and C3 is the best response that the column player can make given that the row player chooses R4.

9. (15 pts.) Read the attached analysis from last week's WSJ. Several years back China attempted to extract surplus from users of heavy rare-earth metals by leveraging its dominant position in world markets. The article describes what has happened since that time. Use Porter's five forces model to analyze these events in the heavy rare-earth metals industry.



Initially, since China controlled 95% of the rare-earth metals market, it was able to cartelize the industry, restrict output (by 40%), and raise prices significantly (ten-fold).

Over time, other factors and other forces came into play:

Entry: "with rare-earth prices high, new mining ventures became economical in Australia and the U.S."

Substitutes: "metals firms began recycling more lanthanum, dysprosium, and other coveted elements from industrial waste." "Companies like Siemens, Samsung, and Honda accelerated research on how to use less of the minerals."

Internal rivalry: "inside China, high prices led to even more rare-earth mining, despite Beijing's desire to consolidate the industry."

Result: "by 2012, a glut of rare earths caused global prices to collapse. Two years later, China failed to export enough even to hit its quotas."

Moral of the story: the ability to conduct a strategic analysis of a market has value outside of ECO 610.

China's Rare-Earths Bust

Honda says it has co-produced the world's first hybrid car engine that doesn't use heavy rare-earth metals, allowing it to cut reliance on imports from China. This innovation, to debut in Honda minivans this fall, illustrates how far we've come since the great rare-earths panic of 2010.

Back then, China produced 95% of global rare earths and thought it could hold markets hostage by restricting exports. So it cut export quotas by 40%, partly to push foreign buyers to move factories onshore, and then temporarily blocked shipments to Japan over a territorial dispute in the East China Sea. Prices shot up tenfold as consumers and officials world-wide feared for supplies of 17 obscure elements they learned are used in high-tech gizmos from missiles to smartphones, wind turbines and electric cars.

But no apocalypse was nigh. Beijing's mercantilist gambit had predictable effects—predictable, at least, for anyone familiar with the work of Julian Simon. The economist taught that fears over natural-resource scarcity often underestimate the flexibility of markets and the ingenuity of the human brain, which Simon called the ultimate resource. Those who warned about “peak oil” were blindsided by fracking, and rare-earth doomsayers failed to foresee how Beijing's supply squeeze would spur overseas investment in new supplies and substitutes.

With rare-earth prices high, new mining ventures became economical in Australia and the

U.S. Metals firms began recycling more lanthanum, dysprosium and other coveted elements from industrial waste. And companies like Siemens, Samsung and Honda accelerated research on how to use less of the minerals, especially the “heavy” rare earths found overwhelmingly in China. Inside China, high prices led to even more rare-

earth mining, despite Beijing's desire to consolidate the industry and curb pollution.

By 2012 a glut of rare earths caused global prices to collapse. Two years later, China failed to export enough even to hit its quotas, which it scrapped last year after losing a case at the World Trade Organization. Mines shut down in China and overseas.

So Honda's new engine should be a helpful reminder. After starting work on replacing rare earths a decade ago, the car giant's apparent turning point was a tie-up with fellow Japanese firm Daido Steel in 2011, prompted by China's squeeze. The result is a new technique for designing crucial engine magnets that avoid heavy rare earths and are 10% cheaper and 8% lighter, Honda says.

There are lessons here for Chinese mercantilists too. Their rare-earths gambit hurt the country diplomatically, stoked a badly polluting domestic industry and spurred technological innovation among rivals. Rare earths can be valuable as exports for tech manufacturers around the world, but as a tool of economic coercion they're a bust.

A new Honda engine shows the limits of Beijing's coercion.