

100 points total. 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.

(15 pts.) You work for a company that produces and sells ready-to-eat cereal to the general public. The marketing department has discovered that there are two types of customers, those who are very price sensitive and who scour the newspaper for discount coupons, and those who are not price sensitive and who never use coupons. Own-price elasticity of demand for the first group is 5 and for the second group is 2. The marginal cost per box of cereal is \$2. Your boss approaches you and asks how to use this information to set the shelf price for cereal, as well as the size of the discount for coupon users.

Inverse elasticity rule:
$$\frac{P - MC}{P} = \frac{1}{E_{x, P_x}}$$

Shelf price should be set for the customers whose demand is less elastic:

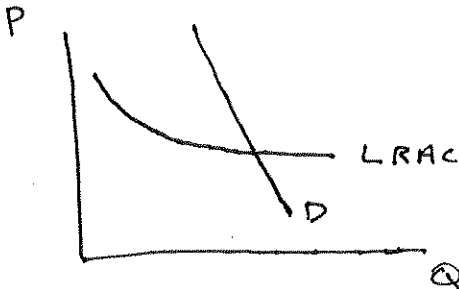
$$\frac{P - 2}{P} = \frac{1}{2}, \quad P - 2 = \frac{P}{2}, \quad P = \$4.00$$

Price for customers with more elastic demand:

$$\frac{P - 2}{P} = \frac{1}{5}, \quad P - 2 = \frac{P}{5}, \quad P = \$2.50$$

So offer a coupon in the newspaper with a redemption value of \$1.50.

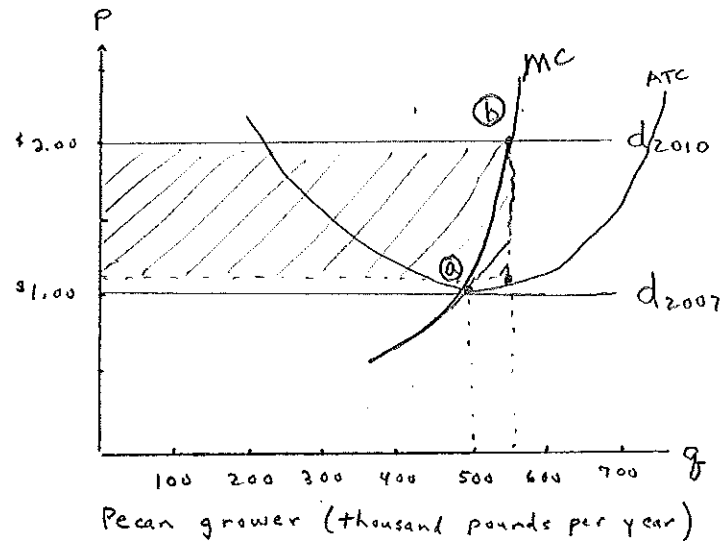
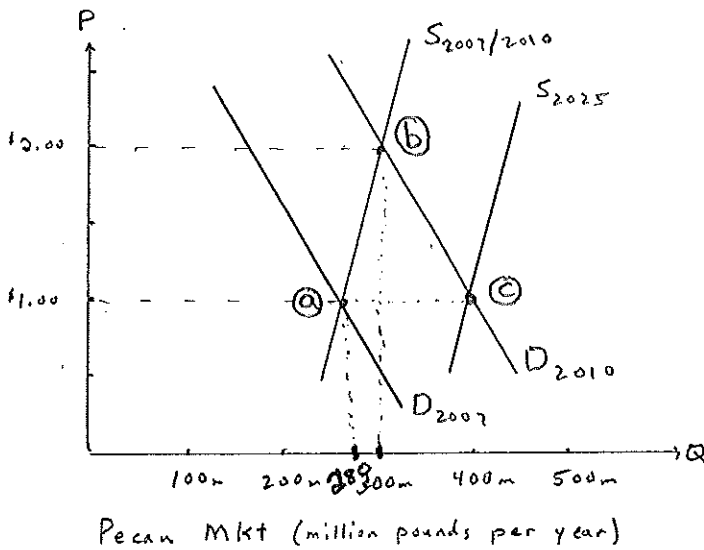
(4 pts.) Airbus and Boeing are both potentially capable of producing a super-jumbo jet, but both come to the conclusion that there is only room for one efficient-sized firm in this part of the passenger jet aircraft market. Draw a graph with an LRAC curve and a market demand curve that are consistent with that. Briefly explain your diagram and reasoning.



MES for producing super-jumbo jets is such that market demand will not support two efficient-sized firms.

(20 pts.) "Life is good for pecan growers" (WSJ, 4/18/11). Chinese consumers have discovered the joy of eating pecans, causing the price of pecans in the shell to increase from \$1 to \$2 per pound between 2007 and 2010. The amount of pecans harvested in the U.S. grew from 280 million pounds to 300 million pounds as a result. Assume that the industry was in long-run equilibrium in 2007. Also assume that a typical pecan grower was producing 500,000 pounds of pecans per year under those market conditions.

- Illustrate the initial 2007 long-run equilibrium in the pecan market. Label both the market outcome and the firm's output choice with (a).
- Show the 2010 market outcome and label it (b). What happens to a typical pecan grower's output and profits? Label with (b).
- Given that it takes over a decade for a newly planted pecan tree to start bearing nuts, explain what you think will happen in this market over time. Illustrate what you think the market will look like in 2025 and label (c).



- (a) $P = \$1$, $Q = 280$ m in 2007. Pecan grower produces $q = 500,000$ and earns zero economic profit.
- (b) Increase in demand pushes market price up to \$2. Equilibrium market output increases to $Q = 300$ m. Pecan grower increases output to where $P = MC$ and earns positive economic profit \square/\square .
- (c) Entry by new firms and expansion by existing firms will have a ten-year lagged effect. Eventually (2025) we expect price to return to the level of min LRAC.
- (2 pts.) What two corporate giants are involved in "Techdom's Two Cold Wars"?

Microsoft and Google

(2 pts.) What airline was the "upstart" that bedeviled United Airlines in the Denver market?

Frontier Airlines

(2 pts.) Professor Anspach invented a board game and spent decades fighting Parker Brothers over the rights to use the name he gave to his game. What did Professor Anspach name his board game?

anti-monopoly

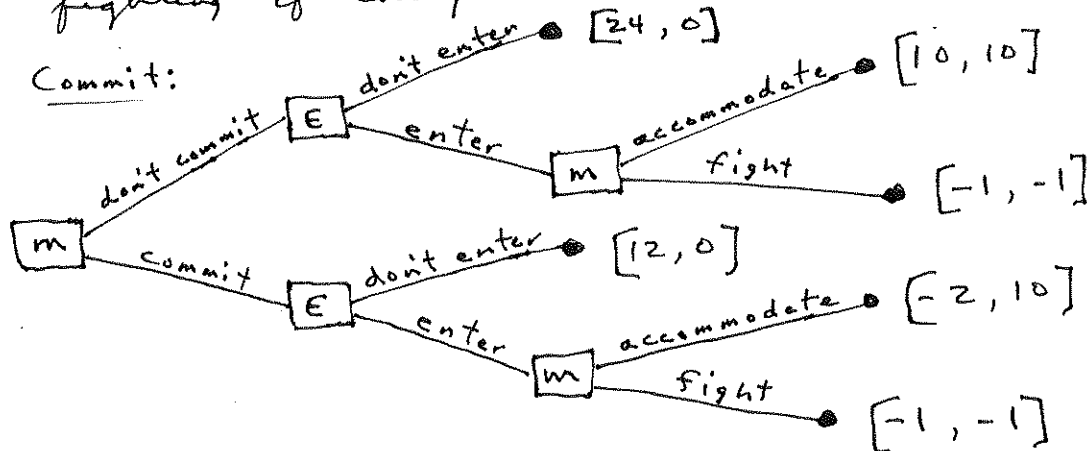
(15 pts.) Your sister is the mayor of Napflio. She awards you the monopoly franchise rights to provide cable TV services to citizens of Napflio. As such, you are the only provider and as long as you have no competition, the discounted present value of your economic profit stream is 24,000,000€. Trouble looms on the horizon, however, because a satellite TV company is considering entering your market. Your monopoly franchise rights only apply to hard-wired cable TV, and do not apply to satellite signals and rooftop satellite dishes. If entry occurs and you share the market with a competitor, your discounted present value of economic profits will fall to 10,000,000€. If you contest entry and fight a price "war," the discounted present value of economic profits is -1,000,000€.

- You announce publicly that if entry occurs, you will fight. Is your threat credible? Why or why not?
- In preparation to fight a price war, you could add capacity to your system, so that you could offer additional channels that your competitor did not. The cost of adding such capacity in preparation to fight for customers is 12,000,000€. Only if entry occurs would you find it necessary to utilize this capacity. Should you make such a commitment to deter entry? Explain why or why not. It would help if you draw the decision tree for this sequential-move game.

$$\Pi_m = 24 \text{ m €} , \quad \Pi_D = 10 \text{ m €} , \quad \Pi_w = -1 \text{ m €}$$

(a) No, your threat is not credible, because you will make more profit by accommodating than by fighting if entry does occur.

(b) Commit:



You can deter entry by adding capacity ex ante. Your threat to fight a price war is credible because you make more (lose less) by fighting than by accommodating ($-1 > -2$). As a committed monopolist you make more than you do as an uncommitted accommodating duopolist ($12 > 10$).

(15 pts.) Suppose that the diamond industry consists of only two producers, Russia and DeBeers. Russia has two possible strategies: produce either 1 million or 2 million carats per year, and DeBeers has two possible strategies: produce either 4 million or 5 million carats per year. Depending on the strategies chosen by Russia and DeBeers, total output in the world market will be 5, 6, or 7 million carats, resulting in a world price of diamonds that is \$2400, \$1800, or \$1200 per carat, respectively, depending on the combined output of Russia and DeBeers. Production costs are \$800 per carat for Russia and \$400 per carat for DeBeers. Determine the profit payoffs of Russia and DeBeers for each combination of possible strategies, and then illustrate these payoffs in a 2x2 matrix. What do you predict will be the outcome of this game?

(a) if $D=4$ and $R=1$, then

$$Q=5 \text{ and } P=24.$$

$$\pi_D = 4(24-4) = 80$$

$$\pi_R = 1(24-8) = 16$$

(b) if $D=4$ and $R=2$, then

$$Q=6 \text{ and } P=18.$$

$$\pi_D = 4(18-4) = 56$$

$$\pi_R = 2(18-8) = 20$$

(c) if $D=5$ and $R=1$, then

$$Q=6 \text{ and } P=18$$

$$\pi_D = 5(18-4) = 70$$

$$\pi_R = 1(18-8) = 10$$

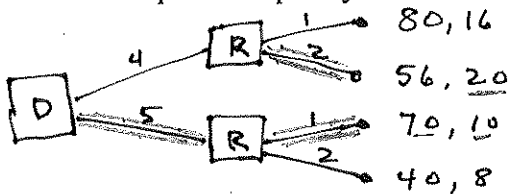
(d) if $D=5$ and $R=2$, then $Q=7$ and $P=12$.

$$\pi_D = 5(12-4) = 40, \quad \pi_R = 2(12-8) = 8$$

		Russia	
		1m	2m
DeBeers	4m	(80), 16	(56), 20
	5m	70, 10	40, 8

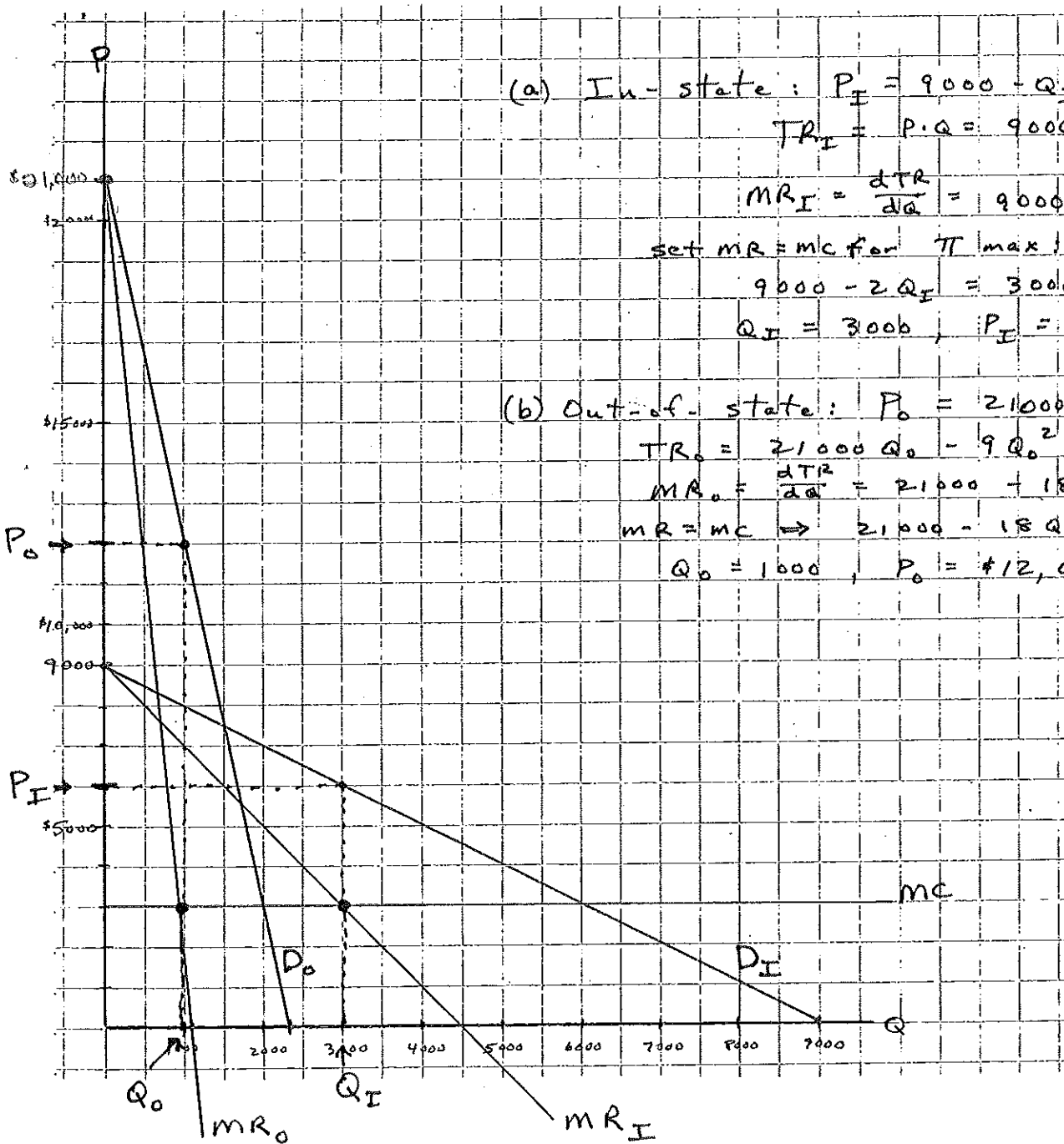
DeBeers has a dominant strategy of producing 4 million carats. Russia's best response is to produce 2 million carats. The strategy pair of $D=4$ and $R=2$ is a Nash equil.

(10 pts.) In the above game between Russia and DeBeers, suppose DeBeers is able to commit to an output choice first, leaving Russia to choose its output given the strategy chosen by DeBeers. Should DeBeers choose to play a sequential move game instead of a simultaneous move game if it has that option? Explain your answer with a game tree.



Anticipating how Russia will respond to each of its possible strategies, DeBeers should choose an output of 5 million carats. Russia will respond by choosing 1 million carats. DeBeers is able to earn a payoff of 70 if it is able to move first, compared with its payoff of 56 in the simultaneous move game.

(15 pts.) Each year a new group of high school seniors chooses where they want to attend college. The University of Kentucky faces two identifiably different categories of customers, in-state and out-of-state students. The (inverse) demand equation for in-state students is given by $P_I = \$9000 - Q_I$, while demand by out-of-state students is given by $P_O = \$21,000 - 9Q_O$. P represents the annual tuition charged by UK and Q represents the number of students who enter as freshmen. The marginal cost of educating an additional student is constant and equal to \$3000. Suppose that the Board of Trustees wants to act as a profit-maximizing monopolist in setting price and output. What tuition should they charge for in-state and out-of-state students, and how many of each would enroll each year? Illustrate your answers in the diagram below.



(a) In-state: $P_I = 9000 - Q_I$
 $TR_I = P \cdot Q = 9000Q_I - Q_I^2$
 $MR_I = \frac{dTR}{dQ} = 9000 - 2Q_I$

set $MR = MC$ for π max:

$$9000 - 2Q_I = 3000$$

$$Q_I = 3000, P_I = \$6,000$$

(b) Out-of-state: $P_O = 21000 - 9Q_O$

$$TR_O = 21000Q_O - 9Q_O^2$$

$$MR_O = \frac{dTR}{dQ} = 21000 - 18Q_O$$

$$MR = MC \Rightarrow 21000 - 18Q_O = 3000$$

$$Q_O = 1000, P_O = \$12,000$$