

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.

1. (5 pts.) How would you categorize the market for pizza in West Liberty, KY, i.e. what type of market structure is it? It might help if you briefly describe the characteristics of this market.

Two firms, differentiated product, low barriers to entry.

So, oligopoly market, but firms' ability to make positive economic profit was limited by hit-and-run entry by pizza producers from surrounding towns.

2. (10 pts.) Suppose there are two cigarette firms, each with 50% of total market sales. Initially, neither firm advertises and each earns profits of \$10. If one firm advertises, at a cost of \$3, and the other does not, then that firm attracts a larger share of cigarette smokers. Its revenues rise by \$5, all of it coming from the other firm's revenues. (Non-smokers are not tempted to take up smoking by the advertising.) If both firms advertise, at a cost of \$3 each, then they end up splitting the market. Draw the payoff matrix to this game and explain what the likely outcome will be.

		Firm C	
		don't advertise	advertise
Firm B	don't advertise	10, 10	5, 12
	advertise	12, 5	7, 7

Both firms have a dominant strategy of advertising, so we predict that they both will advertise and each will earn profits of 7.

Now, if they could get the government to ban advertising for tobacco products . . .

3. (10 pts.) Suppose there are two firms which produce and sell apples to consumers. They initially split the market and each earns profits of \$10. If one of the firms advertises, at a cost of \$3, the advertising stimulates the demand for apples and both firms experience an increase in revenues of \$2. If both firms advertise, then the demand for apples is stimulated even more and both firms experience an increase in revenues of \$4. Draw the payoff matrix to this game and explain what the likely outcome will be.

		firm C	
		don't advertise	advertise
firm R	don't advertise	10, 10	12, 9
	advertise	9, 12	11, 11

Both firms have a dominant strategy of not advertising, so we predict that neither will advertise. Now, if they were to form an industry trade group that advertised on behalf of its members and charged a membership fee...

4. (10 pts.) Hondos, a large department in downtown Athens (Greece, not Kentucky), is trying to determine the profit maximizing price for its Aphrodite line of perfume. The marginal cost of each bottle of perfume is 15€. The manager of the perfume department has found, through price experimentation, that

	At a price of:	A 10% change in price will result in a change in quantity sold of	
①	20€	30%	$\epsilon = 3.0$
②	25€	25%	$\epsilon = 2.5$
③	30€	22%	$\epsilon = 2.2$

If you are constrained to price in 5€ increments, e.g. 20€, 25€, or 30€, what price should you choose to maximize profits? Explain how you arrive at your answer.

$$\bullet \quad \frac{P - MC}{P} \stackrel{?}{=} \frac{1}{\epsilon_{x,P}}$$

$$\textcircled{1} \quad \frac{20 - 15}{20} \stackrel{?}{=} \frac{1}{3.0} \Rightarrow \frac{1}{4} \neq \frac{1}{3}$$

$$\textcircled{2} \quad \frac{25 - 15}{25} \stackrel{?}{=} \frac{1}{2.5} \Rightarrow \frac{10}{25} = \frac{1}{2.5} \checkmark$$

$$\textcircled{3} \quad \frac{30 - 15}{30} \stackrel{?}{=} \frac{1}{2.2} \Rightarrow \frac{1}{2} \neq \frac{1}{2.2}$$

So the inverse elasticity pricing rule for profit maximization is satisfied when $P = 25€$ and own-price elasticity of demand is 2.5.

5. (15 pts.) You have acquired monopoly rights to sell coffee and newspapers in the student center on campus. The marginal cost of each good is \$0.20. After some experimentation, you discover that the four customers who purchase coffee and newspapers from you have the following reservation prices for coffee and for newspapers:

	Abe	Beth	Chris	Dana
P_{coffee}	\$0.10	\$0.40	\$0.80	\$0.90
$P_{\text{newspaper}}$	\$0.90	\$0.80	\$0.40	\$0.10

- What price should you charge if you want to maximize profits from the sale of coffee? What price will maximize profits from the sale of newspapers?
- While waiting in line at the drive-through window at Wendy's, you start thinking about creating a "combo" bundle consisting of a cup of coffee plus a newspaper for your own business. How much profit could you make if you tried a bundling pricing strategy?
- Can you think of a way that would generate more profits than either of the above pricing strategies?

$$\begin{array}{cc} P_c & \Pi_c \\ \$0.90 & .70 \\ \underline{.80} & \underline{1.20} \\ .40 & .60 \end{array} \quad \begin{array}{cc} P_N & \Pi_N \\ .90 & .70 \\ \underline{.80} & \underline{1.20} \\ .40 & .60 \end{array}$$

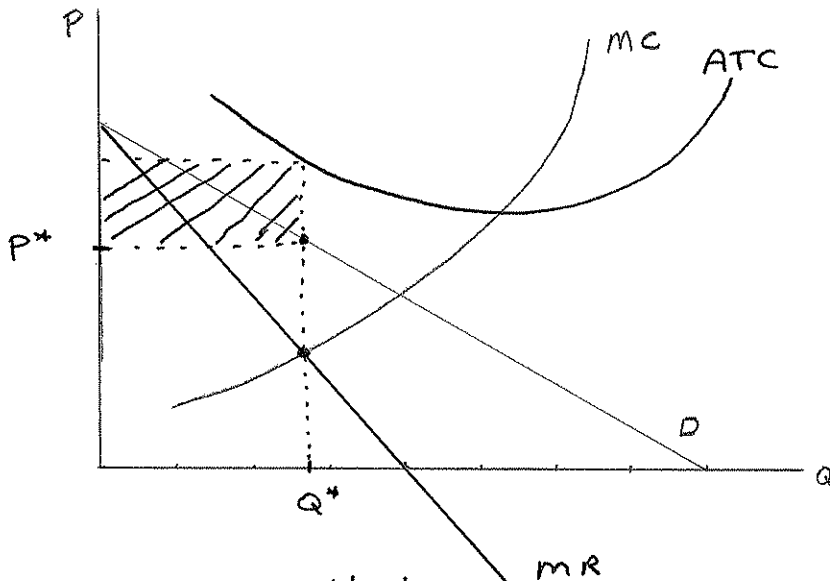
So, set price of coffee = \$.80
and price of newspaper = \$.80.
profit = \$2.40

$$\begin{array}{cc} P_B & \Pi_B \\ \underline{\$1.00} & \underline{2.40} \\ 1.20 & 1.60 \end{array}$$

best price of the coffee - newspaper bundle at \$1.00. all four will buy at that price for total profit of \$2.40.

If you set the price of a newspaper at $P_N = \$0.90$ and the price of coffee at $P_c = \$0.90$, and charge \$1.20 for the combo, then Abe will buy only a newspaper ($\Pi = \$0.70$), Beth and Chris will each buy a newspaper-coffee bundle ($\Pi = \$1.60$), and Dana will buy only a cup of coffee ($\Pi = \$0.70$). Your total profits will be \$3.00! Good thinking.

6. (10 pts.) For many years since graduating from the Gatton College, you have operated a fast-food business in the food court area of a major shopping mall. Inspired by one of your professors, you chose a roast beef theme for your menu. Based on your own experience and that of other fast food businesses in the mall, you conclude that the typical restaurant in this mall is suffering economic losses. The following diagram (partially) illustrates such a situation.
- Illustrate the optimal price and output for your restaurant, given the demand and cost curves shown on the diagram.
 - Illustrate the economic losses and explain what advice you would have for the owner of this mall concerning the amount of space allocated for fast food firms versus clothing and other types of retail stores.



a) P^* and Q^* where
 $MR = MC$.

(b) firm is suffering economic losses, so ATC must be above P . Losses are indicated by the shaded area above. The mall should shift space to retail stores as some restaurants go out of business.

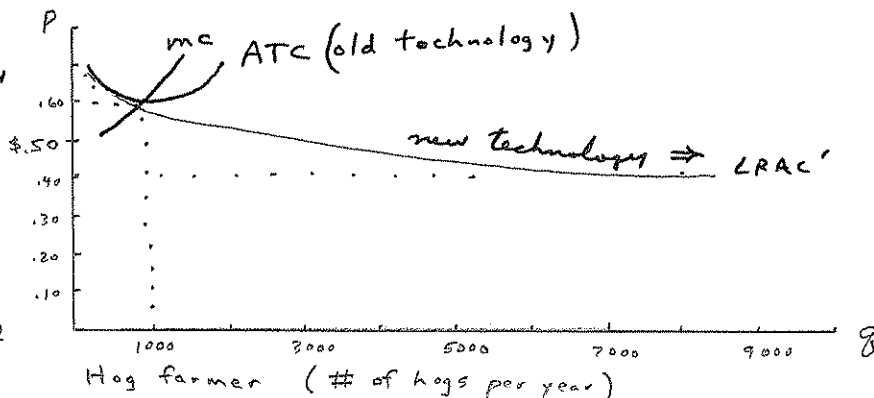
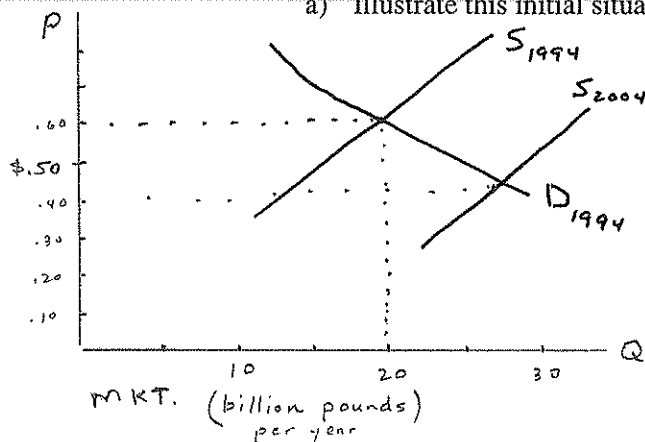
7. (5 pts.) Briefly describe the strategy chosen by Frontier Airlines in the Denver air travel market.

Some of the things Frontier has done:

- raise ticket prices just enough to avoid provoking United, while keeping them low enough to attract passengers.
- fly one or two times per day to each city, so that United does not increase its capacity.
- wait until United announces its schedule, then add service to markets it wants to enter.

8. (15 pts.) The year is 1994. Pork production is a thriving industry in the United States. The typical hog farmer produces pork alongside other agricultural products, and has an annual output of less than a thousand hogs. The industry is in long-run equilibrium, and hogs bring \$0.60 per pound in the market. 20 billion pounds of pork are produced each year.

a) Illustrate this initial situation in the diagrams below:



- b) Hog farmers, many of whom read the *Wall Street Journal*, realize that the adoption of mass production techniques can lead to a significant reduction in the cost of producing pork. Specialized factory hog farms with 10,000 sows can produce pork for \$0.40 per pound. Now for your analysis:

- What will happen to the price of pork in the short run?

Price should slowly begin to fall as pork producers adopt the new technology.

- Predict the price of pork seven to ten years from now.

In a competitive industry price tends toward minimum long run average cost, so \$0.40 per pound.

- Will market output be bigger, the same, or smaller seven to ten years from now?

Consumers will demand more pork at \$0.40 per pound than at \$0.60, so bigger.

- Will there be fewer, the same, or more hog farmers when the industry is in long-run equilibrium once again?

Unless market demand for pork is very, very elastic, we expect fewer hog farmers, with each one being considerably larger than in 1994.

- What sort of return (profits) do you predict hog farmers will be earning seven to ten years from now?

Normal accounting profit, i.e. zero economic profit.

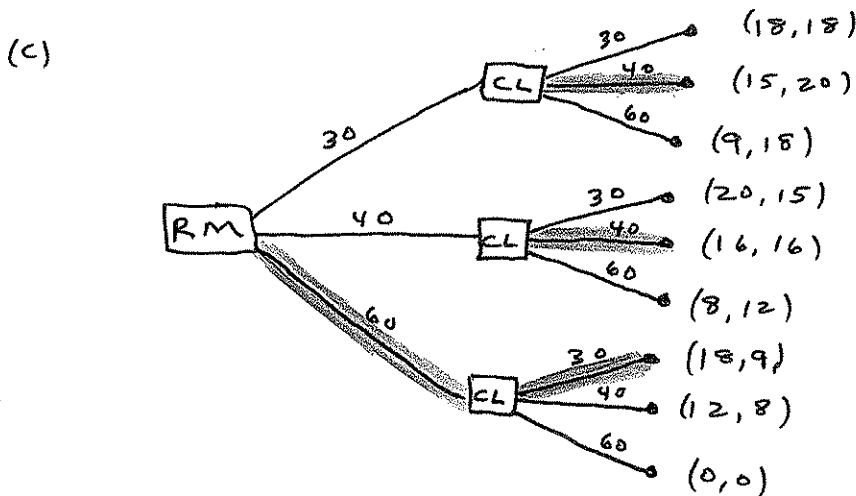
9. (20 pts.) Two firms compete in the summertime dinner cruise market on Lake Cumberland. They must commit dinner cruise ships to the various markets they serve months in advance of the summertime dinner cruise season. One is Royal Mediterranean (RM) and the other is Circus Lines (CL). The marketing department of each firm has worked out the following profit matrix depending on the capacity choice of each firm. Each firm typically puts one dinner cruise boat on Lake Cumberland every summer, and the boats owned by each firm have seating capacities of 30, 40, or 60 people. RM's profits are shown as the first entry in each pair, and CL's profits are the second entry:

		CL's Capacity Choice		
		30 seats	40 seats	60 seats
RM's Capacity choice	30 seats	18,18	15,20	9,18
	40 seats	20,15	16,16	8,12
	60 seats	18,9	12,8	0,0

- What do you predict will be the outcome of this game if the two firms set prices simultaneously?
- Explain the solution concept you used to solve this game.
- Suppose that Royal Mediterranean must choose its capacity first and stick with it, since its boats come from farther away. Then Circus Lines is free to respond as it chooses to Royal Mediterranean's choice of a boat. Draw the game tree and predict the outcome of this sequential move game.
- Suppose instead that Circus Lines must commit first, and Royal Mediterranean goes second. Draw the game tree and predict the outcome of this game.

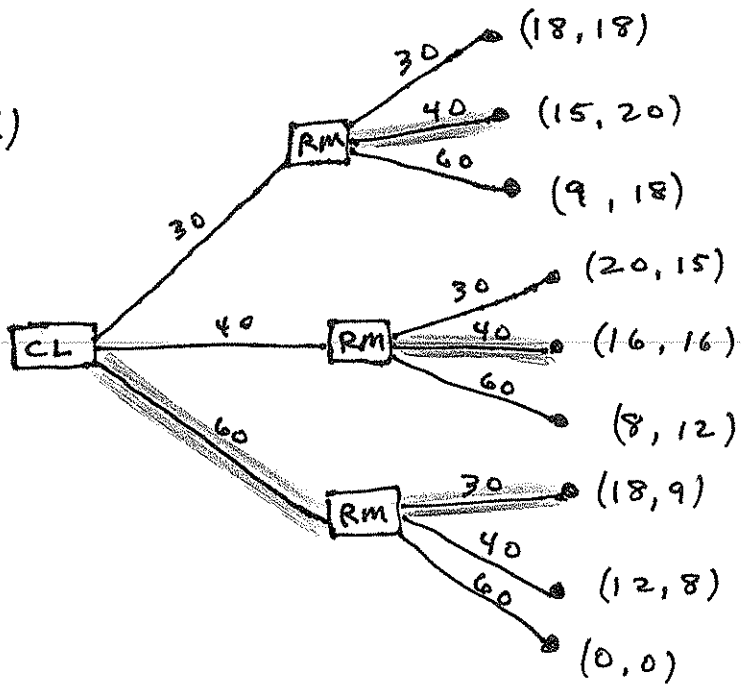
(a) 60 seats is never a best-response for either firm, so eliminate those strategies from consideration. Then each firm has a dominant strategy of choosing a 40-seat boat.

(b) (40, 40) is a Nash equilibrium in that neither firm could choose a better strategy given the strategy selected by their rival.



Using backward induction, we predict that RM will choose capacity of 60, and that CL will then choose capacity of 30.

9. (d)



If CL chooses capacity first, we predict a different outcome. CL will choose a boat with 60 seats, and then RM will choose a 30-seat capacity boat.