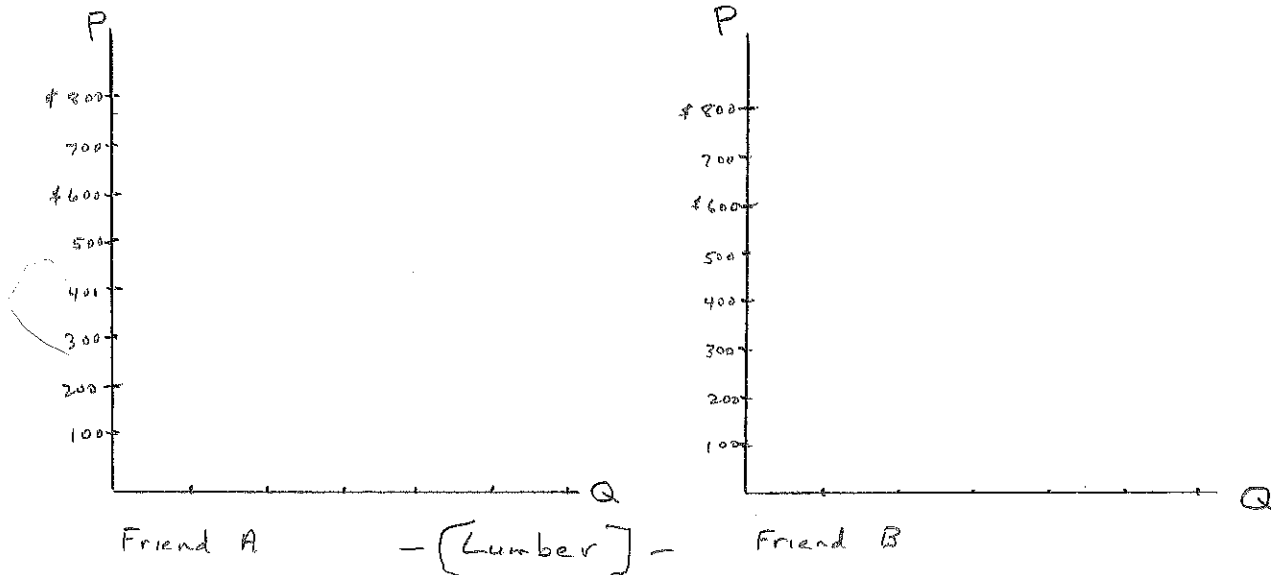


100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (15 pts.) During the calendar year 2018 lumber prices fell from over \$600 per thousand board feet early in the year to \$330 per thousand board feet by the end of the year. One of your friends suggests that the fall in price was due to a decline in new housing starts—fewer new homes were being constructed. Another of your friends disagrees and says that there was a historic glut of pine trees coming to maturity in the southeastern U.S.
 - a) Illustrate and explain each friend's reasoning in the two diagrams below.
 - b) What additional piece of information would help you decide which friend has the more credible explanation?
 - c) Suppose that you are told that the quantity of lumber exchanged was pretty much unchanged during the period that price was declining sharply. How would that affect your assessment of your friends' explanations then?



2. (15 pts.) As brand manager of Pepsico's Quaker Instant Oatmeal, you have access to Kroger's vast database of information. You have experimented with changing the price of your product, and you have also observed how sales vary across stores located in neighborhoods with different socioeconomic characteristics.

a) When you increase the price of a six-pack box of instant oatmeal from \$2.50 to \$3.00, you observe that sales in a typical neighborhood Kroger's grocery store fall from 50 to 45 cases per week. Calculate own-price elasticity of demand, showing your calculations and the formula you use. In a few words, interpret the number that you have calculated.

b) In neighborhoods where the average household income for a family of four is \$40,000, neighborhood Kroger's grocery stores typically sell 45 cases per week. In neighborhoods where the average household income for a family of four is \$60,000, neighborhood Kroger's typically sell 55 cases per week. Calculate income elasticity of demand for Quaker Instant Oatmeal, showing your calculations and the formula that you use. In a few words, interpret the number that you have calculated.

3. (10 pts.) Consider Gillette's pricing problem. It produces lower quality two-blade razors (Sensor), medium-quality three-blade razors (Mach 3), and higher quality five-blade razors (Fusion). It produces Mach 3 and Fusion razors in a one-piece disposable format and a two-piece format with a permanent handle and replaceable blade cartridges. It only makes Sensors in the one-piece disposable format.
- a) Suppose that own-price elasticity of demand for Mach 3 handles is 1.5. Cross-price elasticity between Mach 3 handles and Mach 3 cartridges is -5.0. Cross-price elasticity between Mach 3 handles and disposable Mach 3 razors is 2.0. Explain how revenues from the sales of Mach 3 handles, Mach 3 cartridges, and disposable Mach 3 razors will be affected if Gillette lowers the price of Mach 3 handles by a given amount?
- b) Consumers generally don't consider Sensors to be very good substitutes for Mach 3 handles and cartridges, but do consider Fusions to be pretty good substitutes, although not as good a substitute as the disposable version of the Mach 3. What sort of cross-price elasticity numbers between the price of Mach 3 handles and quantities sold of Sensors and Fusions would be consistent with these facts?

4. A good friend from high school decides to combine her passion for food with her passion for travel, and opens a food truck. She caters to the downtown lunch crowd, after-work beer drinkers at local craft brew-pubs, baseball and soccer families at parks on weekends, and wherever else she is able to find hungry people.
- a) (5 pts.) After operating for several years, she asks you to help her evaluate how her business is doing. She opens her publicly audited books to you, and you see \$275,000 in revenues each year from food sales. You also see \$35,000 in labor costs for hourly workers who help her run the business, \$125,000 in wholesale food costs, \$15,000 for gas and maintenance on the truck, \$20,000 for insurance, taxes, and business license fees, and \$10,000 for advertising and web site expenses. What are her accounting profits?
- b) (10 pts.) Sometimes you help her out on weekends when you have nothing better to do, and in that way you learn the following things. She works full time in her food truck but takes her compensation in the form of profits instead of paying herself a salary. She owns her truck outright, having purchased it a few months ago. Fully outfitted food trucks like hers cost \$75,000 when new, and have an expected life of five years, at which point they are worth nothing. She started working in the restaurant business right after high school, and her last job as a cook paid her \$35,000 per year. To buy her truck she took some money that was invested in indexed mutual funds where it earned 6%. How is she doing? Answer by calculating her economic profits (or losses) from owning and operating this food truck. Carefully explain how you arrive at your answer.
- c) (5 pts.) Suppose she decides to pursue other passions and wants to explore selling her business. She knows that you have an extensive network of fellow MBA students, and asks whether she could accompany you to an MBASA social event to make a sales pitch. Explain briefly whether you think she will find a buyer among this group.

5. (15 pts.) MacDonald's is considering installing automated kiosks in their restaurants. Such kiosks allow customers to stand in front of a big touch screen, choose their menu items, submit their order, and then pay, all without involving a human being standing at a cash register. Of course some customers want a live person taking their order, and some humans are still necessary at the ordering stage to make sure everything works correctly. After trying out this system at a number of restaurants, they find the following tradeoff between automated kiosks and workers. In a typical MacDonald's restaurant, the mix of humans (L) and automated kiosks (K) can process the following number of customer orders per hour (Q):

		Humans (L)			
		L = 1	L = 2	L = 3	L = 4
Kiosks (K)	K = 0	Q = 15	Q = 30	Q = 40	Q = 45
	K = 1	Q = 35	Q = 70	Q = 100	Q = 120
	K = 2	Q = 50	Q = 100	Q = 140	Q = 170

Now for the questions:

- Does this production process exhibit diminishing marginal returns in the short run? Since the obvious answer is yes, select some data points from the above table and use the concept of marginal product to explain how you see diminishing returns in your production process.
- Suppose company cost accountants have determined that the implicit "rental" rate on kiosks when a restaurant installs them is \$12 per hour. Also suppose that your restaurant is located in a labor market where the prevailing wage rate for fast-food workers is \$10 per hour. If you were using L=2 and K=1 to serve 70 customers per hour, how would you accomplish an increase in output from 70 to 100 customers per hour?
- How would your answer change if the local government passed a city-wide increase in the minimum wage to \$15 per hour?

6. (10 pts.) Farmer Jones raises chickens (X). Farmer Smith raises alligators (Y). Farmer Jones' current daily rate of output is 50 chickens, and farmer Smith's daily rate of gators is 5. Each has contemplated expanding their scale of production. They have also discussed the possibility of a merger. A local agricultural extension agent shares the following information about the production technology and costs of producing chickens (X) and alligators (Y), where $C(i, j)$ represents the cost of producing i units of X and j units of Y:

$$C(50,0) = 100$$

$$C(0,5) = 125$$

$$C(100,0) = 180$$

$$C(0,10) = 240$$

$$C(50,5) = 200$$

$$C(100,10) = 380$$

Does the production technology display economies of scale in the production of chickens? Does it display economies of scale in the production of alligators? Does it display economies of scope? In explaining your answers, state whether you expect to see small or big farms producing chickens. Do you expect to see small or big farms producing alligators? Do you expect to see farms specializing in either chickens or alligators, or farms producing both goods simultaneously?

7. (4 pts.) If $Q = 5$, $TVC = 150$. If $Q = 2$, $AFC = 50$. What is ATC if $Q = 5$? Briefly show/explain how you arrive at your answer.

8. (6 pts.) Airlines find that the per passenger cost of transporting people from one destination to another is lower when they use bigger airplanes (6-8 seats across) than when they use smaller planes (3-4 seats across). Can you think of two reasons why they experience such economies of scale?

9. (5 pts.) Boeing and Airbus have both recently decided to do something different about nacelles. What have they changed and why?