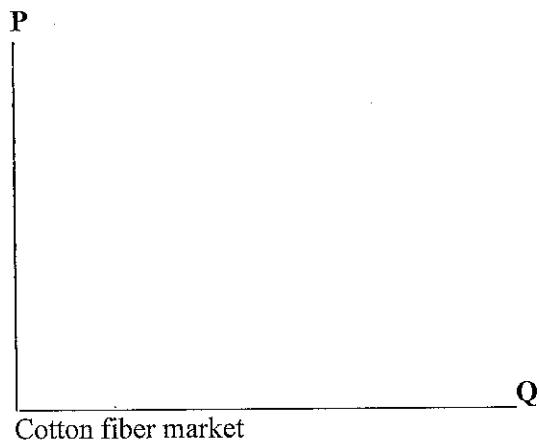
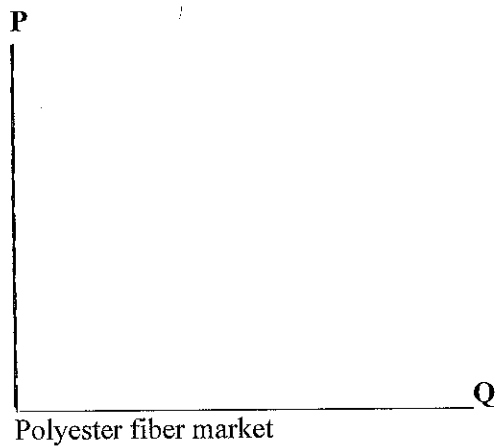
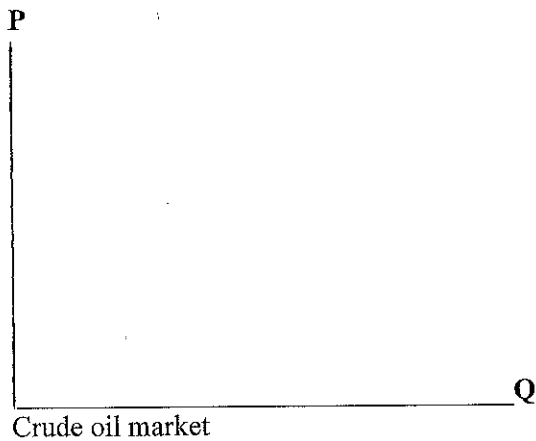


100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (15 pts.) Walmart notices that when it reduces the price of its Schick 4-pack Xtreme3 men's disposable razors from \$7.12 to \$5.97, weekly sales at a typical Walmart SuperCenter increase by 25%.
 - (a) Calculate own-price elasticity of demand for Schick Xtreme3 men's disposable razors. Show your work.
 - (b) Thinking about economic factors affecting whether consumers are likely to be sensitive or insensitive to a price change, what do you think explains the number you calculated in (a)?
 - (c) Walmart keeps the price of its Schick 4-packs of women's disposable Xtreme3 razors constant at \$7.12. Weekly sales at a typical SuperCenter fall from 105 to 95. Calculate the cross-price elasticity of demand between men's and women's Schick Xtreme3 razors, showing your work. Briefly interpret your answer.

2. (15 pts.) This question is based on a research paper entitled "The co-movements of cotton, polyester, and crude oil prices." Basic facts are that cotton and polyester are the two most popular fibers used in textile fabrics for clothing. Cotton is a natural fiber while polyester is a chemical fiber made from petroleum. Now for your analysis. Suppose the fracking revolution in the technology of oil and gas production spreads to other parts of the world. (a) Illustrate and explain what will happen in the world market for crude oil, using supply and demand analysis. (b) Given your answer to (a), use supply and demand analysis to explain how the market for polyester fiber will be affected. (c) Given your answer to (b), use supply and demand analysis to explain how the market for cotton fiber will be affected.



3. (15 pts.) Your professor's younger sister owns and operates a sandwich shop in Fort Walton Beach, FL. The income statement for her business shows annual revenues of \$300,000. Costs include wages for hourly employees (\$70,000), utilities (\$30,000), wholesale cost of food and other supplies (\$80,000), taxes (\$10,000), advertising (\$10,000), and insurance (\$10,000). She quit her job managing an Arby's where she earned \$50,000 per year, but she pays herself no salary in this business. She and her husband own the strip mall where her sandwich shop is located, and the space occupied by her shop previously rented for \$24,000 per year. They have \$80,000 invested in the business, which they could recover if they liquidated. They ask you to help them figure out the "rate of return" they are earning on their \$80,000 that they have invested in the sandwich shop. Evaluate the economic profitability of their business.

4. (20 pts.) As director of operations for Amazon's U.S. fulfillment centers, you oversee a production process that has three primary factors of production: (1) warehouses of given size and configuration, which we will take as fixed over the time period under consideration; (2) humans, who stand at work stations where they pack boxes with items that robots bring to them; and (3) robots, who travel around the warehouse picking out shelves containing items that people like me have ordered online. You have optimized the mix of humans (L) and robots (K) at all of your warehouses based on paying humans \$10 per hour and robots \$5 per hour. In a typical warehouse there are twenty work stations with one human at each one and one hundred little orange robots motoring around the warehouse bringing things to the humans. With this mix you are able to process 500 orders (Q) per hour on average. Having observed productivity when the number of humans is increased or decreased by one and when the number of robots is increased or decreased by one, you have put together the following productivity matrix:

		Robots (K)		
		K = 99	K = 100	K = 101
Humans (L)	L = 19	Q = 470	Q = 480	Q = 489
	L = 20	Q = 490	Q = 500	Q = 509
	L = 21	Q = 508	Q = 518	Q = 527

Now for the questions:

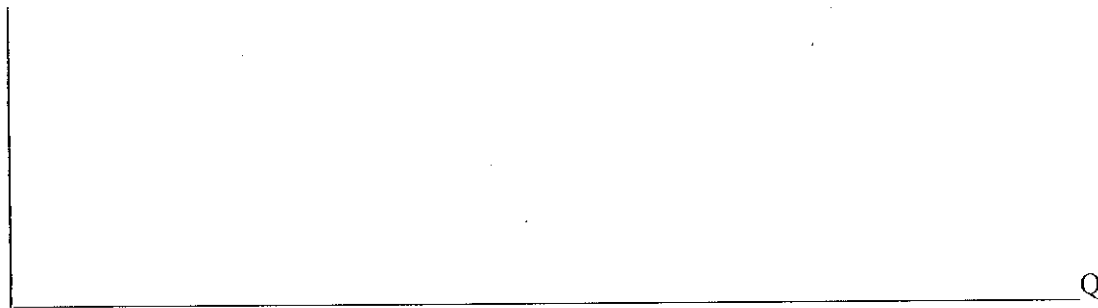
- Does this production process exhibit diminishing marginal returns in the short run? Since the obvious answer is yes, select some data points from the above table and use the concept of marginal product to explain how you see diminishing returns in your production process.
- Confirm that at the current prices for L and K, your mix of inputs (L=20 and K=100) roughly minimizes the cost of processing 500 orders per hour. Show the formula you use in arriving at this answer, and explain what it means.
- Amazon announces that it is raising the starting wage for all employees to \$15 per hour. Using words and the formula from (b), explain how you as director of operations will respond over time in the configuration of humans and robots you employ in your warehouses.

5. (5 pts.) Why might ABInbev, makers of Budweiser, have lower per unit costs than craft brewers like West 6th or Country Boy?

6. (5 pts.) Boeing's 787 Dreamliner has been a very successful plane for the company, with hundreds having been produced and sold. Boeing had considerable trouble, however, selling a dozen or so 787's known as the terrible teens. Briefly explain why, using concepts we have discussed in this course.

7. (5 pts.) Briefly sketch the LRAC curve for a typical fast-food restaurant, and use it to illustrate and explain why there are only a handful of fast-food restaurants in Lawrenceburg, KY.

P, ATC



Fast-food restaurants

