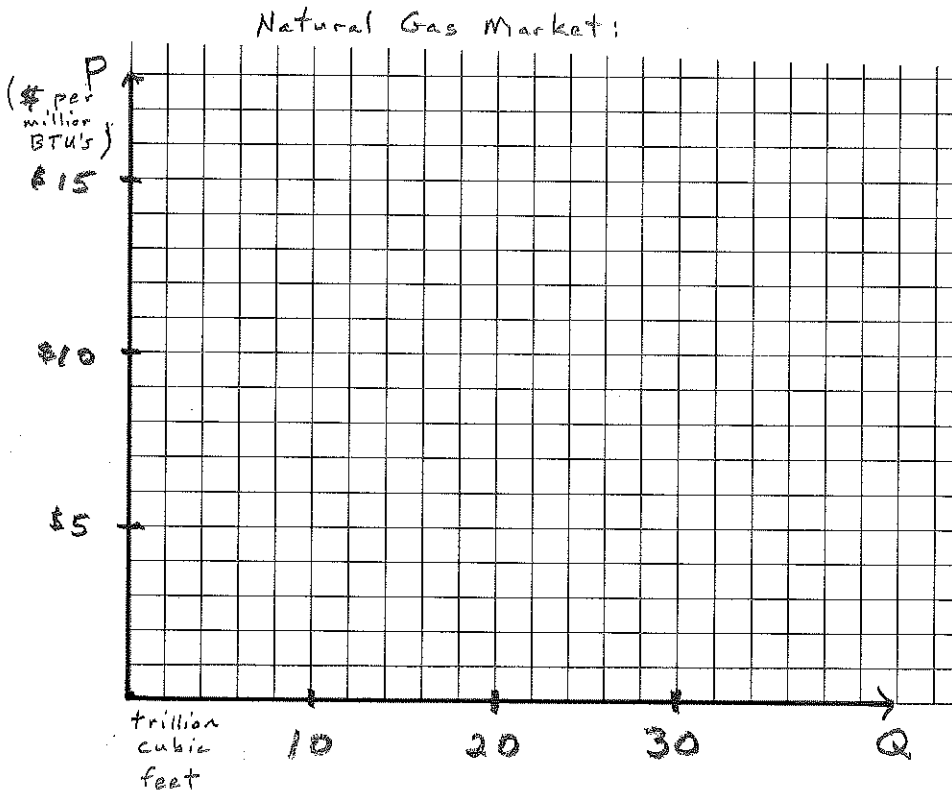


100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (15 pts.) First some facts from a July 2019 *WSJ* article on natural gas markets. Demand for natural gas has been growing slowly but steadily since 2005. In 2005 the price of natural gas in the U.S. was around \$14 per million BTU's, and market equilibrium output was 22 trillion cubic feet. Despite the growth in demand, by 2019 market price had fallen to around \$2 per million BTU's, with 30 trillion cubic feet being bought and sold. In the diagram below, illustrate the market equilibrium in 2005 and in 2019. Before you draw any supply or demand curves, think about how you are going to reconcile the market equilibrium points with continually growing demand. A quote from the article may help you illustrate and explain your answer: "producers in West Texas, drilling primarily for oil, are getting abundant natural gas as a byproduct." The fracking revolution has had a similar impact in other parts of the country. Carefully illustrate and explain what has occurred in this market over the past 15 years using supply and demand analysis.



2. (15 pts.) During the Great Recession of 2007-2009, average household incomes fell by around five percent. Recreational vehicle shipments in the U.S. fell from around 200,000 per year to 150,000 over the same period. Calculate income elasticity of demand for RV's, showing your work. Then explain what type of good RV's are, and what that implies during a recession for a community like Elkhart, IN where 65% of the RV's in the U.S. are manufactured.

3. (15 pts.) Janet opens a shop in Mt. Pleasant, SC that sells Christmas items to tourists. Her sales revenues are \$400,000 per year. She incurs costs of \$200,000 for cost of goods sold, \$75,000 for wages paid to hourly employees, \$20,000 for taxes and insurance, \$25,000 for rent, and \$10,000 for utilities. Janet works full time in the shop and doesn't pay herself a salary. Formerly she worked as office manager in a dentist's office earning \$50,000 per year. She and her husband have \$100,000 of their savings tied up as working capital in the business. They typically earn 5% on their investments in mutual funds.

a) What are Janet's accounting profits?

b) What are Janet's economic profits? Should she continue in the business?

c) After several years, Janet decides that she wants to retire. She offers to sell the business to her sister, who is a CPA earning \$80,000 per year. Her sister evaluates the business and declares that to be a bad idea for her. Is she making a mistake? What would her economic profits be? (Assume that she would take \$100,000 out of her own savings and pay Janet for her investment in the business.)

4. (20 pts.) Labor and capital are used to produce widgets according to the production table below:

		Labor Input				
		1	2	3	4	5
Capital Input	1	20	40	55	65	70
	2	40	60	75	85	90
	3	55	75	90	100	105
	4	65	85	100	110	115
	5	70	90	105	115	120

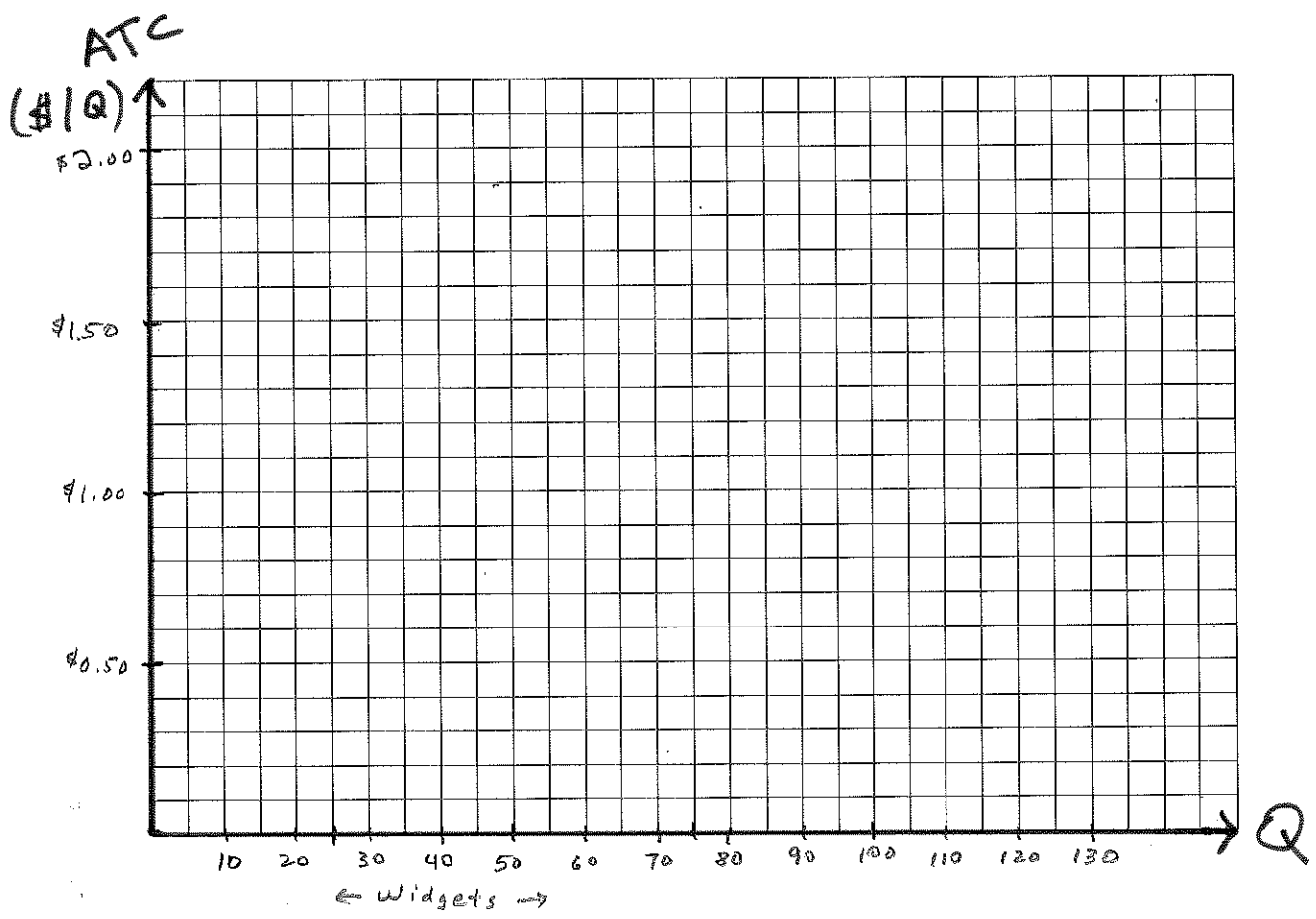
a) Does this production process exhibit short-run diminishing returns? Pick a set of combinations of inputs to illustrate and explain your answer.

b) Suppose capital is fixed at  $K=3$  in the short run. Suppose also that the per unit price of capital is  $v=\$20$ , and the per unit price of labor is  $w=\$20$ . In the attached diagram, graph the firm's SRATC curve.

c) Does this production function exhibit increasing, constant, or decreasing returns to scale? Pick a set of combinations of inputs to illustrate and explain your answer.

d) Now for a question about the LRAC curve. When input prices are the same, the long-run least cost combination of inputs occurs where  $K=L$ , i.e. the amount of capital used equals the amount of labor used. Graph five points on the firm's LRAC curve in your diagram.

Diagram for Question #4



5. (10 pts.) You use fertilizer and insecticide to grow roses in your garden. Given the amounts of each that you are currently using, another pound of fertilizer applied to your rose bushes would yield an additional 10 roses, while an additional quart of insecticide would increase your rose output by 25. Insecticide costs \$5 per quart, and fertilizer costs \$2 per pound. What can we conclude from this information about the economic efficiency of the mix of fertilizer and insecticide you are currently using? Show any formula that you use in arriving at your answer.
6. (5 pts.)  $TFC = \$2000$ ,  $AVC = \$10$ , and  $ATC = \$12$ . What is  $Q$ ?
7. (5 pts.) Why might Kentucky Kingdom lower prices if it hoped to increase total revenue from the sale of tickets in the upcoming season? In other words, what assumption must they be making about demand for their product?

8. (5 pts.) Pick a reason why a firm might experience economies of scale and briefly explain it.

9. (10 pts.) On the first day of class, your group chose a country and discussed its economic organization, in terms of the decision-making process and the ownership of resources. Briefly tell me what country your group chose and what you concluded about how its economy is organized.