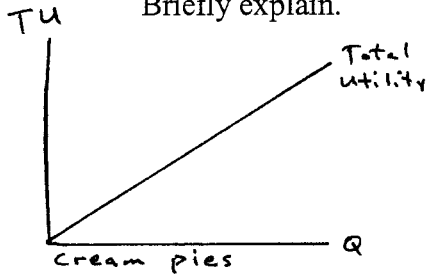


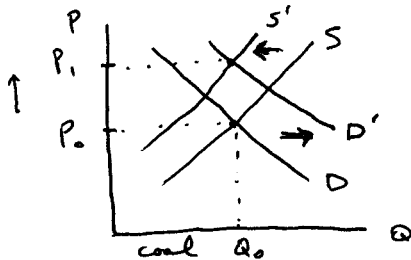
Questions 1-9 are worth 5 points each:

1. The total utility Bozo receives from the consumption of cream pies is given in the diagram below. Does Bozo violate any basic principles of economic behavior? Briefly explain.



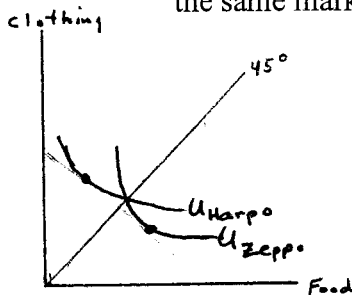
Marginal utility is constant for Bozo's consumption of cream pies. Thus he violates the law of eventually diminishing marginal utility.

2. The market for coal is in long-run equilibrium. The EPA decides to stop issuing permits for the mountain-top-removal process for mining coal. At the same time the prices of other fossil fuels like oil and natural gas rise. What will happen to the market price and output of coal?



Supply decreases and demand increases. Price of coal will definitely rise, but we can't tell whether output will rise or fall.

3. When Zeppo consumes equal amounts of food (X) and clothing (Y), his marginal rate of substitution between the two goods is two units of clothing for one unit of food. When Harpo consumes equal amounts of food and clothing, his marginal rate of substitution is one unit of clothing for two units of food. They both face the same market prices for food and clothing. Who will consume more food?

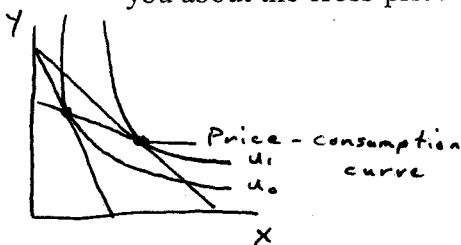


if $F=C$

$$\begin{cases} \text{Zeppo: } MRS_{F,C} = \frac{2C}{1F} \\ \text{Harpo: } MRS_{F,C} = \frac{1C}{2F} \end{cases}$$

Zeppo will consume more food.

4. The price-consumption curve for good X is downward sloping. What does that tell you about the own-price elasticity of demand for good X? What does that tell you about the cross-price elasticity of demand between X and Y?



- P_x falls, expenditures on X rise, so $E_{x,P_x} > 1$, i.e. demand is elastic.
- P_x falls, consumption of Y falls, so $E_{Y,P_x} > 0$ and X and Y are substitutes.

5. Why is a person with only a grade-school education likely to be able to grow tobacco at a lower cost than a person with an MBA degree?

The opportunity cost of a person's time who only has a grade-school education is likely to be lower than the opportunity cost of a person's time who has an MBA degree.

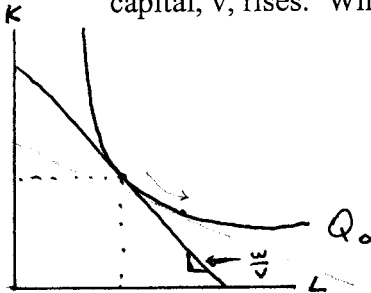
6. $TFC = \$2000$, $AVC = \$10$, and $ATC = \$12$. What is Q ?

$$AFC = ATC - AVC = \$2$$

$$AFC = \frac{TFC}{Q} \Rightarrow 2 = \frac{2000}{Q}$$

$$Q = 1000$$

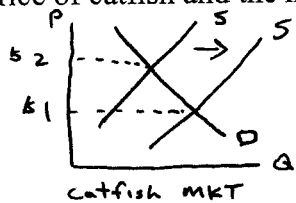
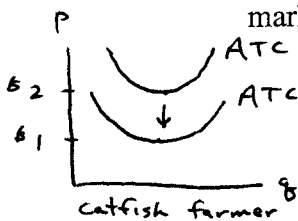
7. A firm is currently employing L and K so as to minimize cost. The rental rate on capital, v , rises. What will happen to $MRTS_{L,K}$?



as v rises, $\frac{w}{v}$ falls and isocost lines become flatter.

To minimize the cost of producing Q_0 , the firm will use more L and less K , and $MRTS_{L,K}$ will decline.

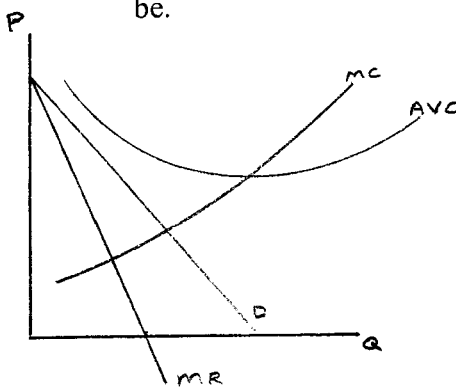
8. Catfish are raised on fish farms throughout the southeastern United States. It is a perfectly competitive industry currently in long-run equilibrium at a price of \$2 per pound. The U.S. Department of Agriculture announces that it is going to subsidize catfish farmers to grow catfish to the tune of \$1 per pound. Predict the market price of catfish and the number of catfish farmers five years from now.



Subsidy causes ATC to decline. Profits attract new firms into the industry. Supply shifts right. So in five years we predict:

- Price falls to \$1 per pound
- More catfish farmers

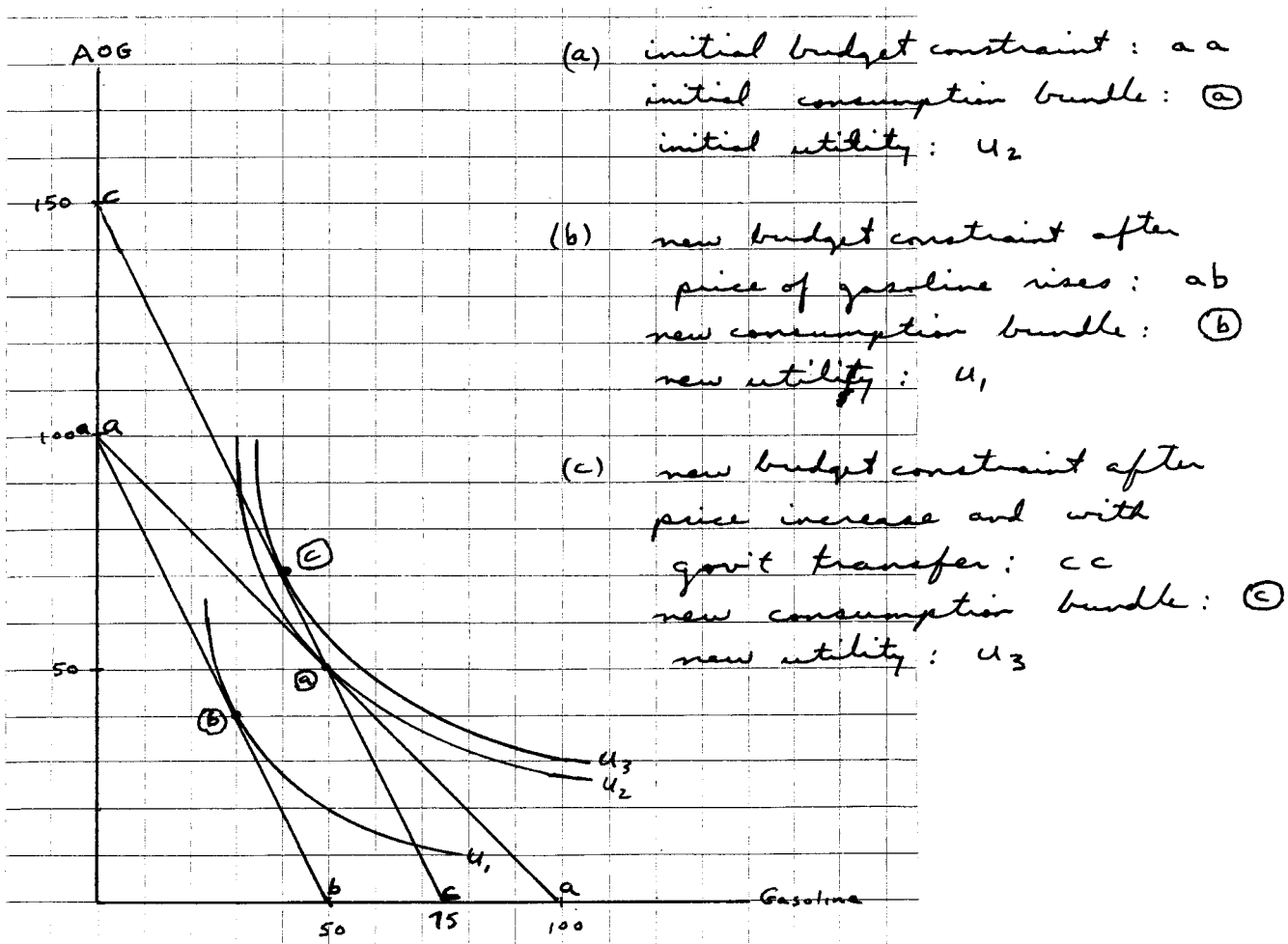
9. You own and operate the only indoor soccer facility in town, i.e. you are a monopolist. You face the following demand and cost conditions this month. Briefly explain how you would set price and output, and what your profits would be.



$P < AVC$ for all Q , so the best thing to do in short run is shut down, or $Q = 0$.

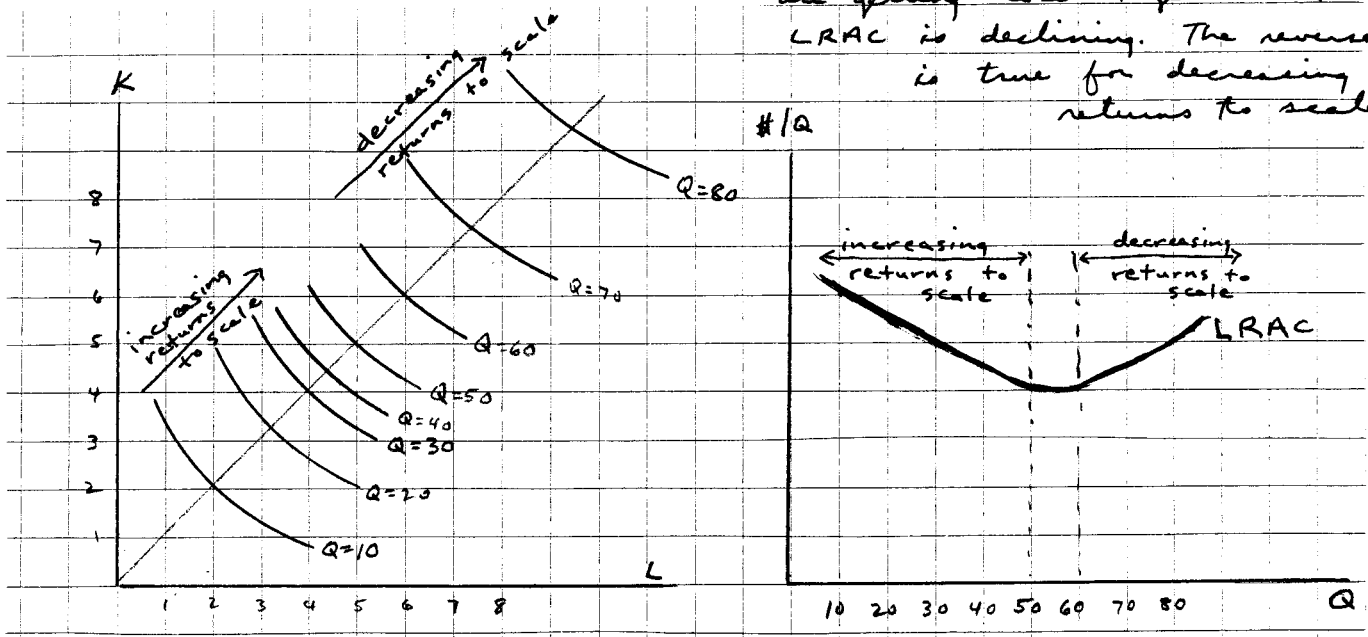
You still have to pay fixed costs, so $\pi = -TFC$

10. (15 pts.) Fabio's weekly income is \$100. He consumes gasoline and a composite commodity we will call AOG. When the price of gasoline is \$1.00 per gallon, Fabio consumes 50 gallons per week. Price rises to \$2.00, and Fabio reduces his weekly consumption to 30 gallons. Suppose Fabio qualifies for a program whereby the state gives him a weekly cash transfer equal to \$50 (=50 gallons X \$1.00/gallon). Does this make him better off, worse off, or equally well off than before the price increase? Illustrate Fabio's (a) initial situation, (b) new situation after the price increase but before the cash transfer, and (c) new situation after the cash transfer in the following diagram.



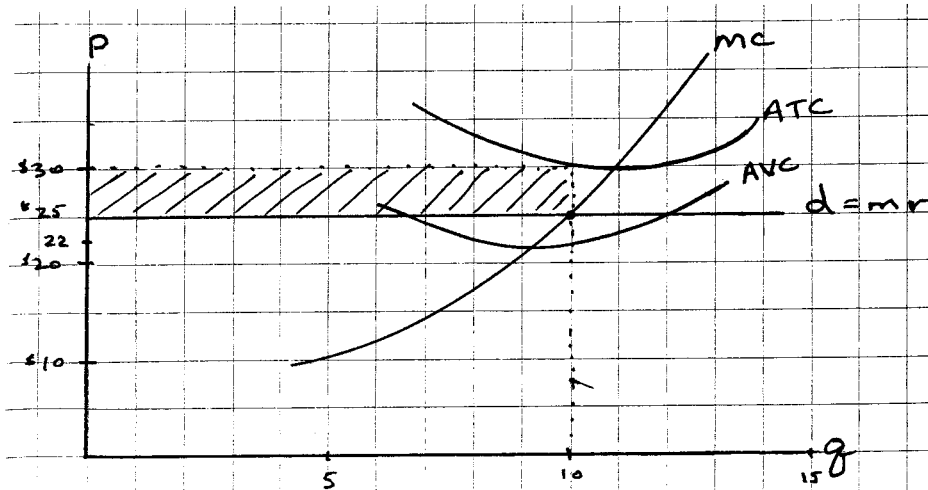
So Fabio can reach a higher indifference curve (U_3) after the price increase and cash transfer than where he was originally (U_2) before the price increase and with no transfer.

11. (10 pts.) In the diagram below sketch and label isoquants consistent with at first increasing and then decreasing returns to scale. Use actual numbers like $Q=10$ and $Q=20$ in your diagram. Then draw a LRAC curve that is consistent with your diagram. Be sure to label the quantity axis carefully so that the two diagrams correspond.



Increasing returns to scale \rightarrow isoquant are getting closer together and LRAC is declining. The reverse is true for decreasing returns to scale.

12. (15 pts.) Richie's Lawn Care Co. operates in the highly competitive Lexington lawn care market. Richie mows ten lawns per day. His total fixed costs are \$80 each day, and his total costs are \$300. Current market conditions dictate that Richie is able to charge at most \$25 per lawn. (a) Illustrate Richie's current profit/revenue/cost situation in the diagram below. (b) What is likely to happen in this market over time?



(a) Richie is a price taker, and his demand and marginal revenue curves are horizontal at $P = \$25$. Since he chooses to produce $q = 10$, his MC curve must cut his d curve at that output. At $q = 10$, $TC = \$300$, so $ATC = \$30$. At $q = 10$, $TFC = \$80$, so $AFC = \$8$ and $AVC = ATC - AFC = \$22$. $\pi = TR - TC = \$250 - \$300 = -\$50$, or the shaded area.

(b) If a typical lawn care firm is suffering economic losses, then we expect exit to occur, which will cause supply to fall and price to rise.

13. (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 answer in the diagram below.

