

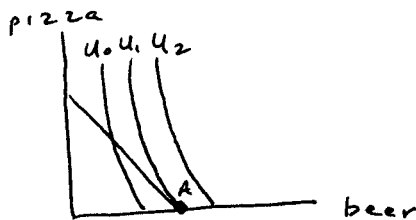
1. (7 pts.) The income elasticity of demand for instant game scratch-off lottery tickets is  $-0.5$ . Should the lottery commission buy advertising space on the sides of municipal buses or in the travel/style section of the local newspaper? Explain your choice in 25 or fewer words.

Instant lottery tickets are an inferior good, so advertise where lower income consumers are more likely to see them — on the sides of city buses.

2. (7 pts.) Is the cross-price elasticity of demand between Gillette Mach 3 razors and Mach 3 blades likely to be  $-5$ ,  $0$ , or  $5$ ? Explain using 25 or fewer words.

Since they are made to be used together, they are close complements. Cross-price elasticity =  $\frac{\% \Delta Q_x}{\% \Delta P_y}$ , so  $(-5)$  since an increase in the price of a razor will lead to a decrease in the sale of blades.

3. (7 pts.) Homer lives in a two-good world, where the two goods are beer and pizza. If Homer chooses to consume a positive amount of beer but zero pizza, then which of the following is true (a)  $MRS_{\text{beer,pizza}} < P_{\text{beer}}/P_{\text{pizza}}$ , (b)  $MRS_{\text{beer,pizza}} = P_{\text{beer}}/P_{\text{pizza}}$ , or (c)  $MRS_{\text{beer,pizza}} > P_{\text{beer}}/P_{\text{pizza}}$ ? Instead of words, you can draw a picture to explain your answer (but a few words wouldn't hurt.)



Homer chooses a bundle like A with zero pizza.

The slope of the indifference curve is steeper than the slope of the budget at bundle A, so

$$MRS_{\text{beer,pizza}} > P_{\text{beer}}/P_{\text{pizza}}$$

4. (7 pts.) You operate a lawn-mowing business, where the two inputs are capital and labor. Given your current mix of capital and labor,  $MP_K = 1$  acre per hour and  $MP_L = 0.5$  acre per hour. The per-hour rental rates on capital and labor are \$15 and \$10, respectively. Are you combining capital and labor in the cost-minimizing way? Briefly explain why or why not.

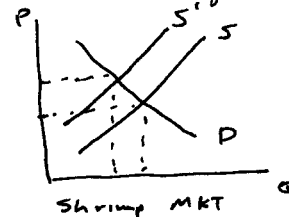
For cost minimization:  $\frac{MP_L}{MP_K} = \frac{P_L}{P_K}$

In this case,  $\frac{MP_L}{MP_K} = \frac{1}{2}$  and  $\frac{P_L}{P_K} = \frac{2}{3}$ .

Since  $\frac{MP_L}{MP_K} < \frac{P_L}{P_K}$ , you should use more capital and less labor.

5. (7 pts.) Suppose domestic shrimpers are successful in their lobbying and a tariff is imposed on imported shrimp. Using only words, briefly explain what you think will happen in the market for shrimp in the U.S.

A tariff on imported (low-cost) shrimp will cause the market supply curve to shift to the left. Price will rise and Americans will reduce their consumption of shrimp.



6. (10 pts.) Since Bubba didn't get it right the first time, he asks you to help him calculate the vehicular costs of delivering pizzas from his restaurant. He estimates that if he delivers 10,000 pizzas per year, he will incur gas, oil, and maintenance costs of \$1000, insurance costs of \$1000, and license fees and taxes of \$500. He anticipates paying \$15,000 for a slightly used pickup truck that he will be able to sell for \$11,000 at the end of the year. He can borrow and lend at 10%. How much does Bubba have to add to the price of a delivered pizza to cover the non-labor cost of delivery? Briefly explain your reasoning.

### Explicit Costs

|                 |               |
|-----------------|---------------|
| gas, oil, mtnce | \$1000        |
| insurance       | \$1000        |
| license + taxes | 500           |
|                 | <u>\$2500</u> |

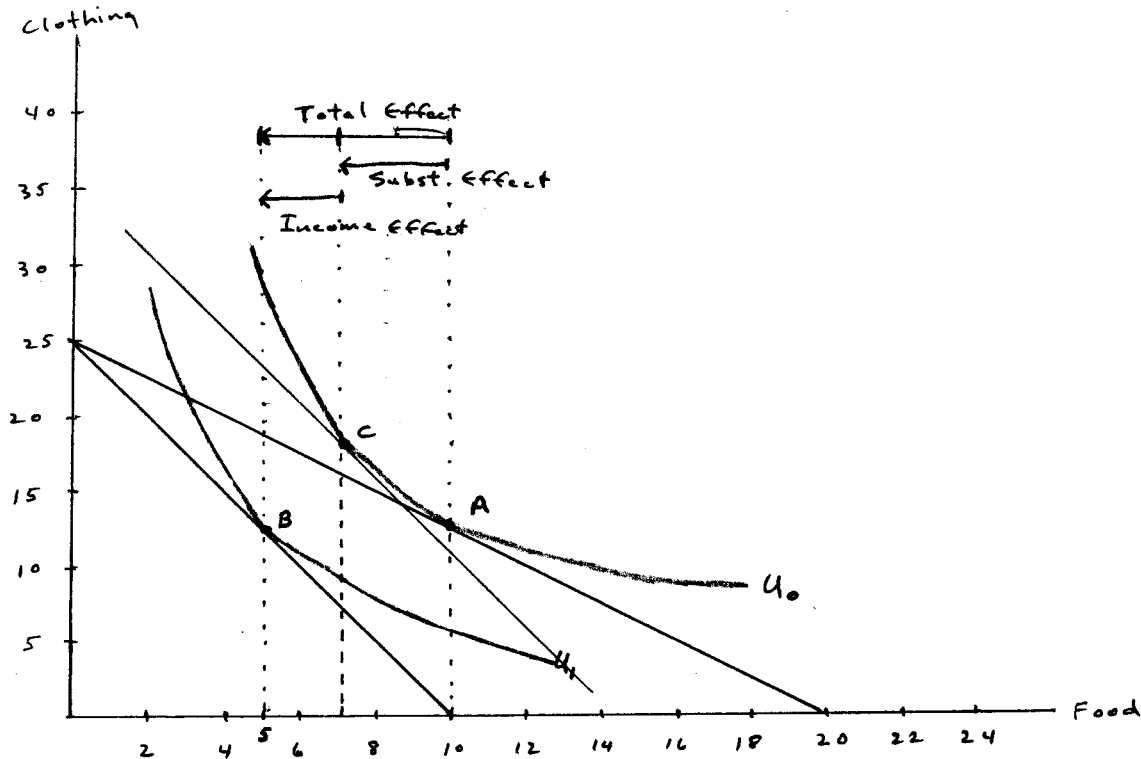
### Implicit Costs

|   |   |               |
|---|---|---------------|
| interest earnings foregone<br>on \$15,000 @ 10% | = | \$1500        |
| depreciation of truck                           | = | \$4000        |
|   |   | <u>\$5500</u> |

Total vehicle costs = \$2500 + \$5500 = \$8000 per year.

Per pizza vehicle cost =  $\frac{\$8000}{10,000 \text{ pizzas}} = \$.80$  per pizza

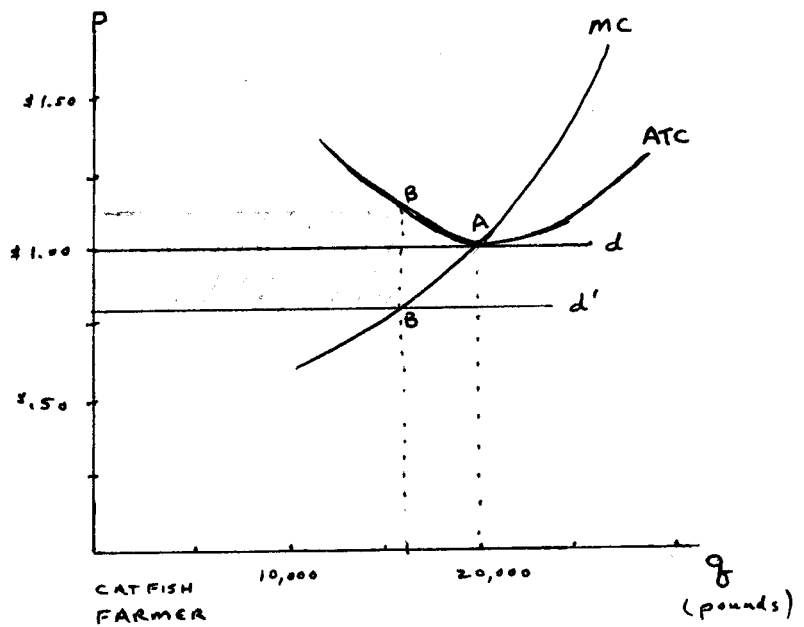
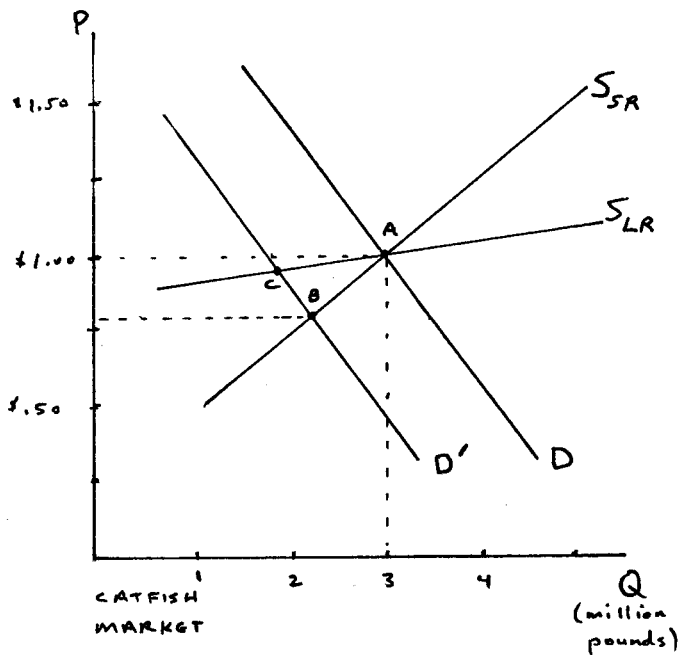
7. (15 pts.) Esmeralda is a simple person, consuming only food and clothing. When her income is \$100 and the prices of food and clothing are \$5 and \$4, respectively, she consumes 10 units of food. When confronted with an increase in the price of food to \$10, she reduces her consumption of food to 5 units of food. In the diagram below, illustrate the income and substitution effects of this increase in the price of food. As it is for most people, food is a necessity but not a luxury for Esmeralda.



Original consumption bundle : A ( Food = 10 , Clothing = 12.5 )  
 New consumption bundle : B ( Food = 5 , Clothing = 12.5 )  
 So the total effect of the price change is from A to B.  
 The substitution effect is from A to C on the original indifference curve  $U_0$ . The income effect is from C to B, where there is an imaginary shift in the budget constraint which changes nominal income but keeps relative prices constant. Since food is a normal good ( $0 < E_I^{(Food)} < 1$ ), the income effect reinforces the substitution effect.

8. (20 pts.) Catfish farming is a thriving industry in the southeastern United States. The industry is currently in long-run equilibrium. The market price of catfish is \$1.00 per pound. 3 million pounds of catfish are bought and sold each year. A typical catfish farmer produces 20,000 pounds of catfish per year.

a) Illustrate this initial situation in the diagrams below:



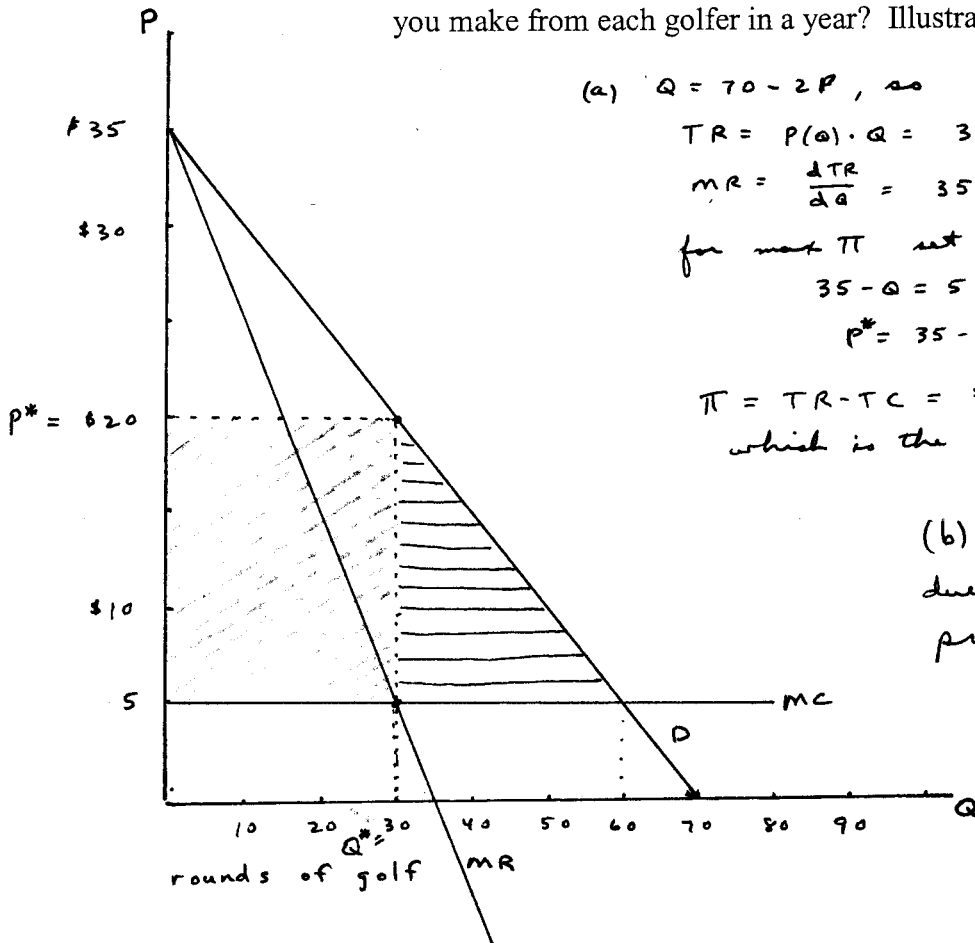
- b) The catfish industry is an increasing cost industry. A glut of alligator meat on the market causes the market demand for catfish to decline. Now for your analysis:

*Long-run supply curve is upward-sloping for an increasing cost industry.*

- What will happen to the price of catfish in the short run?  
*Price will decline sharply (point A to point B), as demand for catfish declines.*
- What will the short-run profit outlook be for catfish farmers?  
*Catfish farmers will suffer short-run economic losses (equal to the shaded area above).*
- Five years from now, will there be more, the same number, or fewer catfish farmers? *Losses will cause some firms to exit, so if the decline in demand is permanent there will be fewer catfish farmers.*
- What will the profit outlook be for catfish farmers who are in the industry five years from now?  
*Long-run expected profit in a perfectly competitive industry  $\Rightarrow$  zero economic profit.*
- Will the price of catfish be equal to, higher than, or lower than \$1.00 five years from now?

*Since catfish farming is an increasing-cost industry, the price of catfish will be lower since market output will be lower. (point c)*

9. (20 pts.) Suppose that you are granted a monopoly charter by the Lexington city council to operate a golf course. You can produce any level of output that you wish at a constant marginal cost of \$5 per unit. Since you own the only golf course in town, anyone who wants to play must play at your course. All golfers are alike, and each one has an annual demand for golf that is given by  $Q=70-2P$ , where  $Q$  refers to the number of rounds played per year and  $P$  refers to price.
- What are the monopoly's profit-maximizing price and output? How much profit do you make off of each golfer in a year? Illustrate in the attached diagram.
  - If the city were to operate the program itself, it would charge \$5 per round. In the diagram, illustrate the deadweight loss due to you behaving as a profit-maximizing monopolist. Calculate the dollar amount of the deadweight loss.
  - Suppose that you decide to sell an annual pass that permits a golfer to pay an annual fee of  $A$  and then pay a price per round of  $P$ . What should the annual fee and the price per round be, and how much profit will you make from each golfer in a year? Illustrate your answer.



$$(a) \quad Q = 70 - 2P, \text{ so } P = 35 - \frac{Q}{2}$$

$$TR = P(Q) \cdot Q = 35Q - \frac{1}{2}Q^2$$

$$MR = \frac{dTR}{dQ} = 35 - Q$$

$$\text{for max } \pi \text{ set } MR = MC:$$

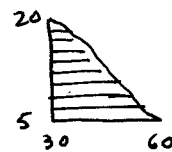
$$35 - Q = 5, \text{ so } Q^* = 30$$

$$P^* = 35 - \frac{Q}{2} = 20$$

$$\pi = TR - TC = \$600 - \$150 = \$450$$

which is the shaded area:

(b) deadweight loss due to monopoly raising price from \$5 to \$20:



$$\frac{1}{2}(15)(30) = \$225$$

The deadweight loss = \$225.

- (c) If you can charge a two-part price, i.e. a membership fee plus a price per round, then profit is maximized by setting the price per round equal to marginal cost,  $P = \$5$ , and setting the annual membership fee equal to the total consumer's surplus . So set fixed fee =  $\frac{1}{2}(30)(60) = \$900$ .