Micro Theory: Exam One Answers
Professor Lemke
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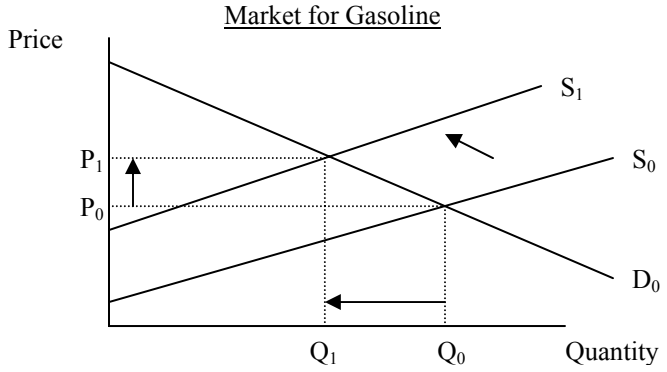
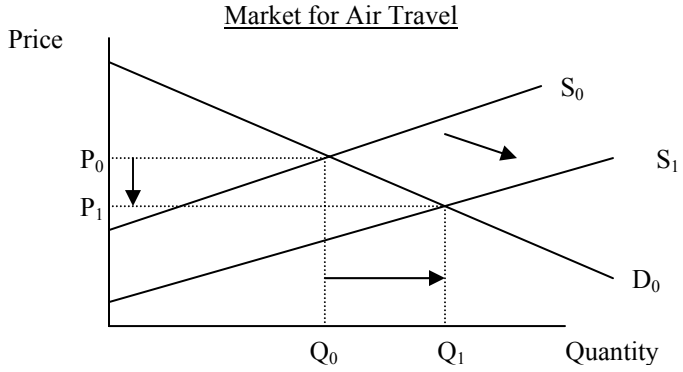
1. For each question below, draw a graph representing your answer. Also specify how equilibrium price and quantity will change in the market in response to the shock.

   A. Consider the market for gasoline in the United States. How will the equilibrium price and quantity change in the wake of hurricanes Katrina and Rita, which left more than twenty-five percent of the infrastructure for oil transportation and oil refining in the U.S. unusable? (8 points)



   As the hurricanes disrupted the production process of gasoline, the cost of producing gasoline will increase. Thus, the supply of gasoline will shift in, and this will result in a lower equilibrium quantity and a high equilibrium price.

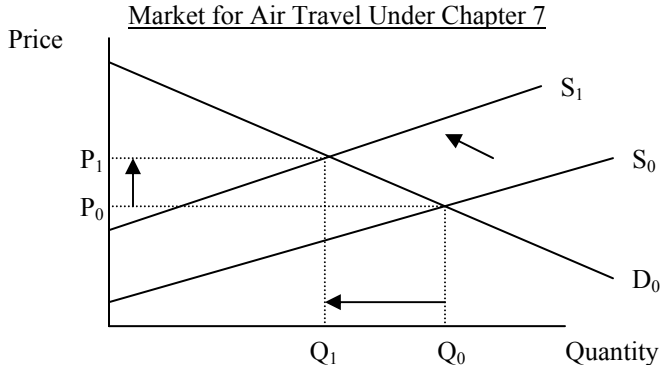
   B. Consider the market for air travel. Recently, Northwest Airlines and Delta Airlines both filed for Chapter 11 bankruptcy. Chapter 11 bankruptcies allow these firms to reorganize their debt structure, financial obligations, and labor contracts to the firms' advantage, while allowing the firms to continue to operate. What effect does the option of Chapter 11 bankruptcy have on the equilibrium price and quantity of air travel? (8 points)



   Chapter 11 bankruptcy allows the firms to reduce costs. Thus, supply of seats for air travel will increase, and this will result in a higher equilibrium quantity and a lower equilibrium price.

C. In contrast to Chapter 11 bankruptcy, the firm is actually dissolved under Chapter 7 bankruptcy. Comment on the different effects Chapter 7 bankruptcy would have on the market in contrast to Chapter 11 bankruptcy. (2 points)

Under Chapter 7 bankruptcy, firms are actually dissolved. This reduces the supply of seats in the air travel industry. Total supply shifts in, which lowers total quantity and increases the price.



D. If the problem with the airline industry is that prices are too low due to over-capacity, which bankruptcy law would be better for the industry in the long run? (2 points)

If the industry needs total capacity to fall and price to increase in the long run, it would be better for the industry to have the government only offer Chapter 7 bankruptcy.

2. Provide short answers or algebraic solutions to the following questions.

A. A firm faces a monthly demand for computers of $q = 7{,}500 - 5p$, where q is the quantity of computers and p is the price of computers in dollars. Currently the firm sells computers at a price of \$900 per computer. What is the elasticity of demand?

At a price of \$900, quantity demanded = 7,500 – 5(900) = 7,500 – 4,500 = 3,000.

Thus, $\varepsilon = \frac{\partial q}{\partial q}\frac{p}{q} = (-5)\frac{900}{3{,}000} = -\frac{4{,}500}{3{,}000} = -1.5$. Thus, the elasticity of demand is -1.5.

B. Using the demand function in part A along with a price of \$900 per computer, by how much will quantity change if the firm increases the price by 10 percent? By how much will revenue change when the firm increases price by 10 percent?

If price increases by 10 percent, quantity demand will decrease by 1.5(10) = 15 percent.

The easiest way to calculate the change in revenue is to calculate revenue under both pricing schemes. When price is \$900, quantity is 3,000 and total revenue is 900(3,000) = \$2,700,000.

When price increases by 10 percent, the new price is 1.1(900) = $990. Likewise, quantity demanded falls by 15 percent, so the new quantity demanded is (0.85)(3,000) = $2,550. Thus, total revenue is $990(2,550) = $2,524,500.

Thus, total revenue has fallen by $2,700,000 – $2,524,500 = $175,500 after the price increase.

C. Ignore parts A and B. What is your best estimate of the elasticity of demand for ice cream cones? What is your best estimate of the elasticity of demand for Dairy Queen ice cream cones? Explain both answers in terms of their magnitude and in relation to each another.

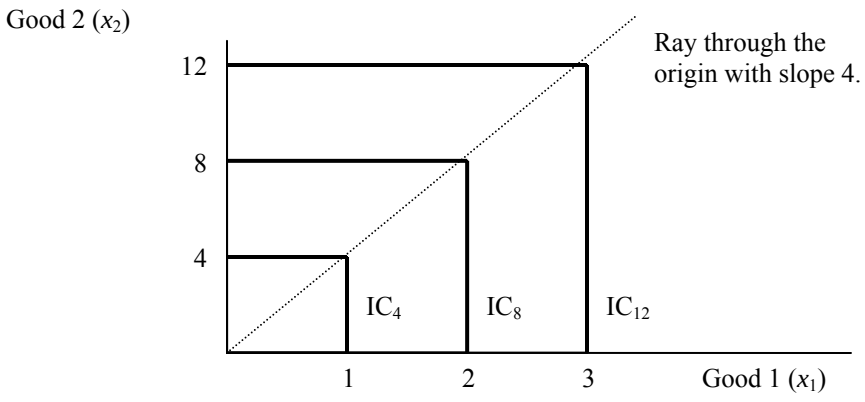
My guess is that demand for ice cream cones are relatively elastic as there are many other food items one could buy as treats or as dessert. So, I would estimate that $\varepsilon_{\text{Ice Cream Cones}} = -3$. In contrast, there are even more substitutes for Dairy Queen ice cream cones. So, it must be that demand for Dairy Queen ice cream cones is even more elastic than ice cream cones in general. Thus, I would guess that $\varepsilon_{\text{Dairy Queen Ice Cream Cones}} = -5$.

3. Suppose preferences for two goods, x_1 and x_2, can be described as $u(x_1,x_2) = \max \{ 4x_1, x_2 \}$, where the "max" function means that the value of the function is the greater of the two elements in the set. Graph some of the indifference curves associated with this preference ordering. Label your graph completely. (10 points)

To graph some indifference curves, choose a bundle, and find other bundles that yield the same utility. As an example, notice that:

$u(1,0) = u(1,4) = u(0,4) = 4$ and $u(2,0) = u(2,8) = u(0,8) = 8$ and $u(3,0) = u(3,12) = u(0,12) = 12$.

Thus, indifference curves are inverted L's, as shown below.



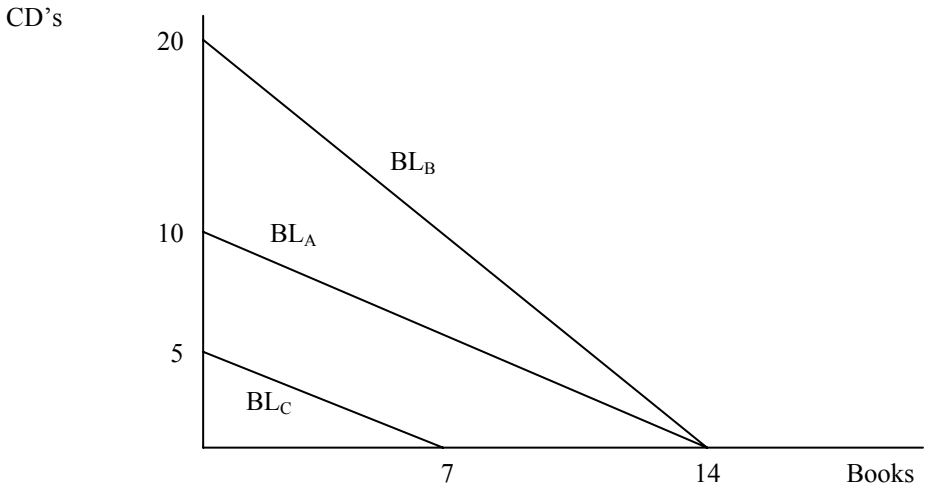
4. Consider a market with two goods – books and cd's. On the same graph, draw three budget lines corresponding to the requirements given in parts A – C below. Label the graph completely, and label the budget lines BL_A, BL_B, and BL_C. Put books on the *x*-axis and cd's on *y*-axis.

   A. The price of each book is \$10. The price of each cd is \$14. The budget is \$140.

   B. Same as in part A except that the price of each CD falls to \$7.

   C. Same as part A except that income decreases to \$70.

   The math should be fairly easy for each of these three problems. Here are the three budget lines.



5. The concession stands at the circus only sell cotton candy and soda. Let x_1 represent cotton candy, and let x_2 represent popcorn. The price of each cotton candy is \$1.25. The price of each soda is \$2.50. Candice has a budget of \$15. Suppose Candice always consumes two cotton candies with one soda.

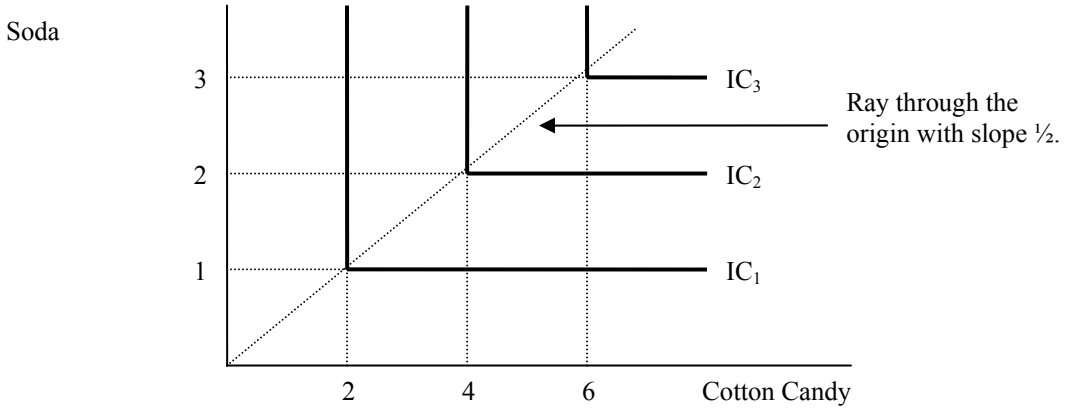
   A. Write an algebraic expression (i.e., a function of the sort: $u(x_1, x_2) = \ldots$) capturing Candice's preferences for cotton candy and soda.

   The utility function that matches what we said in class is $u(x_1, x_2) = \min\left\{\frac{1}{2}x_1, x_2\right\}$, but any monotonic transformation of this will suffice.

   B. Write an algebraic expression capturing Candice's preferences for cotton candy and soda that is different from your answer in part A.

   Any monotonic transformation of the utility function given above works. Thus, some possible examples are: $v(x_1, x_2) = \min\left\{\frac{1}{2}x_1, x_2\right\} + 1$ and $w(x_1, x_2) = \min\{x_1, 2x_2\}$.

C. Graph some of Candice's indifference curves on a graph. Label the graph completely.



D. How much of each good does Candice consume in order to maximize her happiness?

Candice consumes 2 cotton candies with each soda. Thus, the price of each of these bundles of goods is $2p_{CC} + 1p_{Soda} = 2(1.25) + 2.50 = \$5.00$. With a budget of \$15, therefore, Candice purchases three bundles, which means she purchases 6 cotton candies and 3 sodas.

6. Consider a market with just two goods – bologna and cheese. Everyone listed below has well-behaved preferences. Treat each of the following questions separately.

A. The price of each pound of bologna is \$2.50. The price of each pound of cheese is \$4. If Aaron's optimal bundle is to consume 4 pounds of bologna and 2 pounds of cheese, what is Aarons's budget?

The optimal bundle must exhaust income. Therefore:

$$Y = p_B x_B + p_C x_C = (\$2.50)(4) + (\$4.00)(2) = \$10 + \$8 = \$18.$$

Aaron's budget is \$18.

B. Suppose Belle's optimal bundle is to consume 5 pounds of bologna and 3 pounds of cheese. Further, suppose Belle receives 2 units of utility from consuming the fifth pound of bologna. How much utility does Belle receive from consuming her third pound of cheese if the price of each pound of bologna is \$1 and the price of each pound of cheese is \$3?

Given: $B^* = 5$, $C^* = 3$, $MU_{B=5} = 2$, $p_B = \$1$, and $p_C = \$3$.

At the optimal bundle when a positive amount of both goods is consumed (and preferences are well-behaved), we know that the marginal utility per dollar is equated across goods. In this case, that means:

$$\frac{MU_{B=5}}{p_B} = \frac{MU_{C=3}}{p_C} \text{ which implies } \frac{2}{1} = \frac{MU_{C=3}}{3}, \text{ and therefore } MU_{C=3} = 6.$$

C. Suppose Chad's preferences for bologna (b) and cheese (c) can be represented as $u(b,c) = 4b^3c^{12}$. If Chad's budget is \$16 and the price of each pound of bologna is \$1.60 and the price of each pound of cheese is \$0.80, what is Chad's optimal consumption bundle?

Optimal demands for Cobb-Douglas preferences are income shares, so first transform the utility function to $v(b,c) = b^{\alpha}c^{1-\alpha}$. In this case, therefore,

$$v(b,c) = b^{0.2}c^{0.8} \text{ as } \alpha = a / (a+b) = 3 / (3+12) = 3/15 = 0.2.$$

Now, $b^* = \alpha Y/p_b = (0.2)(16)/1.60 = 2$ pounds of bologna;
$c^* = (1-\alpha)Y/p_c = (0.8)(16)/0.8 = 16$ pounds of cheese.

D. Suppose Denise's budget is \$20 and each product costs \$2 per pound. If Denise would consume seven pounds of bologna and three pounds of cheese, she would receive ten units of utility from the seventh pound of bologna and fifteen units of utility from the third pound of cheese. In relation to consuming seven pounds of bologna and three pounds of cheese, what can you say about Denise's optimal consumption bundle?

Given: $Y = \$20$, $p_b = p_c = \$2.00$. When Denise consumes (b=7, c=3), she receives $MU_{b=7} = 10$ and $MU_{c=3} = 15$. Thus, at this consumption bundle, we have that

$$\frac{MU_{b=7}}{p_b} = \frac{10}{2} = 5 \text{ while } \frac{MU_{c=3}}{p_c} = \frac{15}{2} = 7.5 .$$

As Denise receives more marginal utility per dollar from consuming cheese than consuming bologna at this particular consumption bundle, we know that her optimal consumption bundle will contain more than 3 pounds of cheese and less than 7 pounds of bologna.