

Review Problems for the First Exam
 Answers to Follow over the Week End

1) We began the term by studying demand functions. An example would be:

$$Q^{\text{Big Macs}} = D(\text{Price}_{\text{Big Macs}}, / \text{Price}_{\text{Pizzas}} \dots \text{etc.}, \text{perceived food safety, income, etc.})$$

When we draw the standard demand curve for Big Macs, we hold all right hand side variables constant except $\text{Price}_{\text{Big Macs}}$ and we graph the relationship between $Q^{\text{Big Macs}}$ and $\text{Price}_{\text{Big Macs}}$.

We can see that it is possible to use the same technique to draw other kinds of demand curves. Draw each of the four curves whose axes are described below. In each case, give a brief explanation of why you have drawn the shape of the curve as you have. As with a standard demand curve, we assume all variables are constant except the two involved in the curve you are drawing.

	Variable on Horizontal Axis	Variable on Vertical Axis
0) Standard Demand Curve (no need to draw this one)	Quantity of Big Macs	Price of Big Macs
1) First Curve to Draw	Quantity of Big Macs	Price of pizza
2) Second Curve to Draw	Quantity of Big Macs	Price of exterior house paint
3) Third Curve to Draw	Quantity of Big Macs	Price of French Fries
4) Last Curve to Draw	Quantity of Big Macs	Income

2) Yogi Berra, the famous New York Yankee catcher and quotemeister once said about a particular restaurant, "Nobody goes there anymore - it's too crowded"

a) Use supply and demand curves to assess whether Berra's statement makes sense. If the statement does not make sense, try to pin down the problem in the logic. Describe, as best you

can, the kernel of truth in the statement.

b) What incentive does this restaurant have to lower its prices? How does your answer to this question relate to Anna's question in class about why higher education costs so much? In framing your answer, think about your own experience – i.e. in addition to being accepted by DUSP, you were likely accepted by one or more MCP programs that cost less than MIT. Why didn't you go to one of those?

c) In 1999, a report by Mass Inc., a Boston-based think tank, argued that the lack of affordable housing was a serious obstacle to economic growth in the state. Does this statement make more or less sense than Yogi's quote? Given your understanding of the housing market, are there obvious policies the state could follow to increase the supply of desirable housing? To what extent should housing policy involve schools? Illustrate your answers with supply and demand diagrams.

3) Suppose that the current market equilibrium price of #7 red wheat is \$3.57 per bushel. Congress holds hearings and says that this price is too low for family farms to survive. It passes legislation to authorize the Department of Agriculture to buy as many bushels of red wheat as farmers want to sell at a price of \$4.00 per bushel.

Draw the supply/demand equilibrium for wheat without the relief plan and with the relief plan. Show under the relief plan the amount of #7 red wheat (if any) purchased by private consumers, the amount of #7 red wheat (if any) purchased by the Department of Agriculture, and the revenue received by farmers and the total cost to the taxpayer.

4) When my son, Dave, was a sophomore at the University of Michigan, he used to eat breakfast regularly at a diner called Mr. Greek's Coney Island, where he could get 2 eggs, bacon, hash browns potatoes, 2 cups of coffee and a load of toast for \$3.80, a quite low price by Ann Arbor standards. But this price only held until 11:00 AM. Mr. Greek's serves breakfast all day but after 11:00, the price of the same meal rises to \$5.50.

a) If we only consider the demand side of the market, why might such pricing behavior be surprising?

b) If we consider supply as well as demand, explain why the pricing behavior makes sense. Where, if at all, does the idea of opportunity cost fit into your answer?

5) The demand function for local bus service (measured in rides per day) is given by the function

$$Q = 5,000 - 1000p$$

where Q is the number of rides per day and p is the price.

The current price is \$1.00 per ride. The bus company is losing money and it has applied to the

local public service commission for a rate increase. Citizens for Affordable Transit (CAT) argues that if the bus company wants higher revenues, the price should be lowered - not raised - so that more riders will be attracted and total revenues will rise. Which side is correct? If you need more information to answer the problem, specify the nature of the missing information.

6) In 1982, cigarette consumption in the United States totaled about 30 billion packs at an average price including tax of \$.85 per pack. In 1983, Congress passed a general tax bill including a temporary increase of the federal tax on cigarettes from \$.08 to \$.16 per pack. In 1984, cigarette consumption dropped to 29.5 billion packs.

a) Given this information, what is the approximate price elasticity of demand for cigarettes? In your answer, assume the only change in price between 1982 and 1984 involved the change in taxes. Would you describe this portion of the demand curve as elastic or inelastic?

b) In 1985, the \$.08 per pack tax was due to expire. Some experts argued that rather than cutting the federal tax in half, the federal tax ought to be doubled to \$.32 per pack on the grounds that it would significantly reduce the likelihood that a person would smoke cigarettes. Explain why you agree or disagree that doubling the tax would have this effect.

c) Suppose that after analyzing the problem, you were told that in recent years the total number of persons over 15 years old had been growing at 5% per year. How, if at all, does this fact change your answers to (a) and (b)?

7) You are doing a marketing survey in which you pick supermarket shoppers at random and follow them as they make their purchases, recording each purchase and its price.

In this particular supermarket, customers are first routed past the fresh vegetable section and you find that many customers purchase at least one head of lettuce. Given this data, consider the following reasoning:

“Suppose a head of iceberg lettuce costs \$1.10. The fact that a customer buys this lettuce indicates the lettuce is worth at least \$1.10 to them. Based on this fact, it is probable that the customer will buy at least one more head of lettuce and may well spend all of his or her grocery money on lettuce.”

Using consumer choice theory and the standard assumptions we make about a consumer's utility function, carefully explain the mistakes in this reasoning. Also explain:

- What your answer has to do with the fact that the slope of an indifference curve is not constant as we move along the curve.
- What your answer has to do with the concept of diminishing marginal utility.

8) Suppose my utility function for apples and hamburgers can be written:

$$U(\text{hamburgers, apples}) = 6H^{.5} + 4A^{.5}$$

- a) Calculate expressions for both the marginal utility of hamburger and the marginal utility of apples.
- b) Suppose the price of Apples is \$.50 and the price of Hamburger is \$2.00. What is the ratio of apples to hamburgers in my utility maximizing solution.
- c) Suppose total income is \$YYYY (i.e. an unknown amount). Express the quantities of Apples and Hamburgers will you buy in the utility maximizing solution as a function of YYYY.
- 9) Over time, as you begin work and your income rises, it is a good bet that your consumption patterns will change. For example, in absolute amounts, your consumption of video rentals (or DVD rentals) and live theater performances will both increase. But your consumption of live theater performances will increase faster so that the ratio of live theater performances /video rentals will rise even if the price of each good does not change from its present value.

Suppose your tastes for video rentals and live theater performances can be written:

$$U(\text{Video Rentals, Theater Performances})$$

- a) Draw two or three indifference curves and budget lines that exhibit the relative shift from video rentals to live theater as your income rises.
- b) Roughly speaking, we can say that you had always wanted to attend live theater performances but you were held back by a lack of income. Explain why this preference does not contradict the assumption of diminishing marginal utility for each good in your utility function. (Begin by reminding yourself of what diminishing marginal utility actually means).
- c) In the problem sets, you have worked with a utility function involving the natural log function. Consider the function:

$$U = 6\text{LN}(\text{Video Rentals}) + 6\text{LN}(\text{Theater Performances})$$

Explain why this particular utility function **cannot** represent the behavior described in a). A good place to start your explanation is to think through the solutions you get when solving a utility maximization problem using this function.
