

Homework # 4 = 5, 8
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PROBLEM SET

- For each of the following events, consider how you might react. What things might you consume more or less of? Would you work more or less? Would you increase or decrease your saving? Are your responses consistent with the discussion of household behavior in this chapter?
 - Tuition at your college is cut 25 percent.
 - You receive an award that pays you \$300 per month for the next 5 years.
 - The price of food doubles. (If you are on a meal plan, assume that your board charges double.)
 - A new business opens up nearby offering part-time jobs at \$20 per hour.
- The following table gives a hypothetical total utility schedule for the Cookie Monster (CM):

Number of Cookies	Total Utility
0	0
1	100
2	200
3	275
4	325
5	350
6	360
7	360

Calculate the CM's marginal utility schedule. Draw a graph of total and marginal utility. If cookies cost the CM 5 cents each, what is the maximum number of cookies he would most likely eat?

- Kamika lives in Chicago but goes to school in Tucson, Arizona. For the last 2 years, she has made four trips home each year. During 2001, the price of a round-trip ticket from Chicago to Tucson increased from \$350 to \$600. As a result, Kamika bought five fewer CDs that year and decided not to drive to Phoenix with friends for an expensive rock concert.
 - Explain how Kamika's demand for CDs and concert tickets can be affected by an increase in air travel prices.
 - By using this example, explain why both income and substitution effects might be expected to reduce the number of trips home that Kamika takes.
- Sketch the following budget constraints:

	P_X	P_Y	Income
a.	\$20	\$ 50	\$1,000
b.	40	50	1,000
c.	20	100	1,000
d.	20	50	2,000
e.	.25	.25	7.00
f.	.25	.50	7.00
g.	.50	.25	7.00

- On January 1, Professor Smith made a resolution to lose some weight and save some money. He decided that he would strictly budget \$100 for lunches each month. For lunch he has only two choices: the faculty club, where the price of a lunch is \$5, and Alice's Restaurant, where the price of a lunch is \$10. Every day that he does not eat lunch, he runs 5 miles.

- Assuming that Professor Smith spends the entire \$100 each month at either Alice's or the club, sketch his budget constraint. Show actual numbers on the axes.
 - Last month Professor Smith chose to eat at the club 10 times and at Alice's 5 times. Does this choice fit within his budget constraint?
 - Last month, Alice ran a half-price lunch special all month. All lunches were reduced to \$5. Show the effect on Professor Smith's budget constraint.
- Steve Forbes, Republican candidate for President during the primary elections in the year 2000, advocated cutting tax rates across the board, thus raising take-home pay for all taxpayers. The purpose was in part to encourage work and increase the supply of labor. People will respond by working longer hours (supplying more labor) as long as income effects are greater than substitution effects. Do you agree or disagree? Explain your answer.
 - Assume that Mei has \$100 per month to divide between dinners at a Chinese restaurant and nights at Zanzibar, a local pub. Assume that going to Zanzibar costs \$20 and eating at the Chinese restaurant costs \$10. Suppose that Mei spends two nights at Zanzibar and eats six times at the Chinese restaurant.
 - Draw Mei's budget constraint and show that she can afford six dinners and two nights at Zanzibar.
 - Assume that Mei comes into some money and can now spend \$200 per month. Draw her new budget constraint.
 - As a result of the increase in income, Mei decides to spend eight nights at Zanzibar and eat at the Chinese restaurant four times. What kind of a good is Chinese food? What kind of a good is a night at Zanzibar?
 - What part of the increase in Zanzibar trips is due to the income effect, and which part is due to the substitution effect? Explain your answer.
 - Say whether you agree or disagree with each of the following statements, and explain your reason:
 - "If the income effect of a wage change dominates the substitution effect for a given household, and the household works longer hours following a wage change, wages must have risen."
 - "In product markets when a price falls, the substitution effect leads to more consumption, but for normal goods, the income effect leads to less consumption."
 - Suppose that the price of X is \$5 and the price of Y is \$10 and a hypothetical household has \$500 to spend per month on goods X and Y.
 - Sketch the household budget constraint.
 - Assume that the household splits its income equally between X and Y. Show where the household ends up on the budget constraint.
 - Suppose that the household income doubles to \$1,000. Sketch the new budget constraint facing the household.
 - Suppose after the change the household spends \$200 on Y and \$800 on X. This implies that X is a normal or inferior good? What about Y?
 - For this problem, assume that Joe has \$80 to spend on books and movies each month, and that both goods must be

This is the same rule derived in our earlier discussion without using indifference curves. We can describe this rule intuitively by saying that consumers maximize their total utility by equating the marginal utility per dollar spent on X with the marginal utility per dollar spent on Y . If this rule did not hold, utility could be increased by shifting money from one good to the other.

DERIVING A DEMAND CURVE FROM INDIFFERENCE CURVES AND BUDGET CONSTRAINTS

We now turn to the task of deriving a simple demand curve from indifference curves and budget constraints. A demand curve shows the quantity of a single good, X in this case, that a consumer will demand at various prices. To derive the demand curve, we need to confront our consumer with several alternative prices for X while keeping other prices, income, and preferences constant.

Figure 5A.4 shows the derivation. We begin with price P_X^1 . At that price, the utility-maximizing point is A , where the consumer demands X_1 units of X . Therefore, in the right-hand diagram, we plot P_X^1 against X_1 . This is the first point on our demand curve.

Now we lower the price of X to P_X^2 . Lowering the price expands the opportunity set, and the budget constraint shifts to the right. Because the price of X has fallen, if our consumer spends all of the income on X , the individual can buy more of it. Our consumer is also better off, because of being able to move to a higher indifference curve. The new utility-maximizing point is B , where the consumer demands X_2 units of X . Because the consumer demands X_2 units of X at a price of P_X^2 , we plot P_X^2 against X_2 in the right-hand diagram. A second price cut to P_X^3 moves our consumer to point C , with a demand of X_3 units of X , and so on. Thus, we see how the demand curve can be derived from a consumer's preference map and budget constraint.

SUMMARY

1. An *indifference curve* is a set of points, each point representing a combination of goods X and Y , all of which yield the same total utility. A particular consumer's set of indifference curves is called a *preference map*.
2. The slope of an indifference curve is the ratio of the marginal utility of X to the marginal utility of Y , and it is negative.
3. As long as indifference curves are convex to the origin, utility maximization will take place at that point at which the indifference curve is just tangent to—that is, just touches—the budget constraint. The utility-maximizing rule can also be written as $MU_X/P_X = MU_Y/P_Y$.

REVIEW TERMS AND CONCEPTS

indifference curve A set of points, each point representing a combination of goods X and Y , all of which yield the same total utility. 127

marginal rate of substitution MU_X/MU_Y ; the ratio at which a household is willing to substitute good Y for good X . 127

preference map A consumer's set of indifference curves. 127

PROBLEM SET

1. Which of the four assumptions that were made at the beginning of the Appendix are violated by the indifference curves in Figure 1? Explain.
2. Assume that a household receives a weekly income of \$100. If Figure 2 on p. 131 represents the choices of that household as the price of X changes, plot three points on the household demand curve.

*3. If Ann's marginal rate of substitution of Y for X is 5—that is, $MU_X/MU_Y = 5$ —the price of X is \$9.00, and the price of Y is

\$2.00, she is spending too much of her income on Y . Do you agree or disagree? Explain your answer using a graph.

- *4. Assume that Jim is a rational consumer who consumes only two goods, apples (A) and nuts (N). Assume that his marginal rate of substitution of apples for nuts is given by the following formula:

$$MRS = MU_N/MU_A = A/N$$

*Note: Problems marked with an asterisk are more challenging.