

f. An individual demand curve for a good shifts when income changes. When the good is normal, an increase in income shifts the demand curve to the right, and a decline in income shifts the demand curve to the left. When a good is inferior, these patterns are reversed.

***6. How economists determine a consumer's preferences**

a. If we can observe a sufficient number of consumer choices with sufficient variation in prices and income, we

can trace the shape of a consumer's indifference curve. These choices reveal the consumer's preferences.

b. In practice, economists have few opportunities to observe a single consumer make a large number of choices. Instead, they usually combine data on the choices of many individuals, using statistical procedures to allow for differences in individual preferences.

ADDITIONAL EXERCISES

***Exercise 5.1:** The price of bread is \$0.50 per pound, and the price of butter is \$0.25 per ounce. Channing spends all of her income, buying 12 pounds of bread, 7 ounces of butter, and nothing else. What is her income? Draw her budget constraint and identify her chosen consumption bundle.

Exercise 5.2: The price of bread is \$0.75 per pound, and the price of butter is \$0.20 per ounce. Rupert's income is \$15, with which he buys 6 pounds of bread. How much butter does he buy, assuming that he consumes nothing else? Draw his budget constraint and identify his chosen consumption bundle.

Exercise 5.3: The price of bread is \$0.60 and Aaron's income is \$40. He buys 45 pounds of bread, 26 ounces of butter, and nothing else. What is the price of butter? Draw Aaron's budget constraint and identify his chosen consumption bundle.

Exercise 5.4: As in exercise 4.3, Gary has two children, Kevin and Dora, who consume "yummies" and nothing else. He loves them equally and is happiest when their consumption is equal. Suppose that Kevin starts out with two yummies and Dora with eight yummies, and that Gary can redistribute their yummies. Draw a "budget line" that shows his available choices and indicate his best choice by adding indifference curves. How would your answer differ if Kevin started out with six yummies and Dora with four?

Exercise 5.5: Oscar starts out with budget line L_p , consuming bundle A in Figure 5.17 (page 150). What point will he choose if the prices of soup and bread double? If they fall by 50 percent? If his income doubles along with prices?

Exercise 5.6: Alan can spend \$10 a week on snacks. He likes ice cream, which costs \$1 per ounce, and popcorn, which costs 40 cents per ounce. Draw Alan's budget constraint and indifference curves (assuming that each of his indifference curves has a declining MRS) and show his best choice. Now imagine that his older sister Alice hates ice cream but always steals half his popcorn. How does this problem change Alan's budget constraint? On the indifference curves you've drawn, show his new best choice.

Exercise 5.7: Assuming that indifference curves have declining MRSs, could a consumer like the one depicted in Figure 5.6(a) (page 132) have more than one best choice on the budget line? To answer this question, pick two points on the budget line and try drawing two indifference curves, one through each point, and both tangent to the budget line.

***Exercise 5.8:** Olivia has received a \$15 gift certificate that is redeemable only for roasted peanuts. Bags of roasted peanuts come in two sizes, regular and jumbo. A regular bag contains 30 peanuts and a jumbo bag contains 50. If a regular bag costs 50 cents and a jumbo bag costs 75 cents, how many of each will Olivia purchase? What if the jumbo bag costs \$1? In each case, draw a budget line that shows her available choices, and indicate her best choice by adding indifference curves. Assume that Olivia cares only about the number of peanuts, and not about the size of the bag.

Exercise 5.9: Natasha's marginal rate of substitution for concerts with films, MRS_{CF} , is F/C , where C stands for the number of concerts and F stands for the number of films. Natasha's income is \$100 per month. Suppose she buys twice as many film tickets as concert tickets. If the price of a film ticket is \$4, what is the price of a concert ticket?

***Exercise 5.10:** Suppose Table 4.2 (page 96) describes Madeline's preference ranking. As in Examples 5.1 and 5.2 (pages 125 and 131), assume that her income is \$6 per day and bread costs \$2 per loaf. We know from Example 5.2 that when soup costs \$2 per bowl, she eats two bowls of soup and one loaf of bread. From in-text exercise 5.3 (page 132), you should know how much soup and bread she consumes when soup costs \$4 per bowl. What will she consume if soup costs \$6 per bowl? Each of these choices corresponds to a point on her demand curve for soup. Plot them.

***Exercise 5.11:** As in worked-out problems 5.2 and 5.5 (pages 136 and 146), imagine that Natasha spends all of her monthly income on tickets to concerts and films. Suppose the formula for her marginal rate of substitution is $MRS_{CF} = (3 + F)/2C$.

(Remember that fractions of tickets are allowed; if she buys half a concert ticket, that means she watches a concert every other month.) Suppose Natasha's income is \$300 per month. Concert tickets cost \$5 each. Draw her price-consumption curve (allowing the price of film tickets to vary), and draw her demand curve for film tickets.

Exercise 5.12: Using the information in Table 5.5 (page 151), plot the Engel curve for bread. Using the information in Table 5.6 (page 152), plot the Engel curve for beef. Do these curves slope upward or downward? Why?

Exercise 5.13: As in exercise 4.5, Ada prefers to eat soup and bread in fixed proportions. When she eats X pints of soup, she prefers to eat \sqrt{X} ounces of bread. If she has X pints of soup and more than \sqrt{X} ounces of bread, she eats all the soup along with \sqrt{X} ounces of bread, and throws the extra bread away. If she has X pints of soup and fewer than \sqrt{X} ounces of bread (say Y ounces), she eats all the bread along with Y^2 ounces of soup and throws the extra soup away.

Assume she spends all her income on soup and bread. Plot her income-consumption curve, her Engel curve for soup, and her Engel curve for bread.

***Exercise 5.14:** Ashley spends all her income on gasoline and food. At first she earns \$100, buys 25 gallons of gasoline at \$2 per gallon, and purchases 10 pounds of food at \$5 per pound. Her income later rises to \$200, but the price of gasoline increases to \$5 per gallon, and the price of food rises to \$7 per pound. Is she better or worse off? Why? Draw Ashley's budget constraint before and after the change in income, and identify her best choice before the change.

***Exercise 5.15:** Make the same assumptions as in exercise 5.14, except that the price of food rises to \$8 instead of \$7. Can you say whether Ashley is better or worse off? What if she purchases 11 pounds of food after the change in prices and income? What if she purchases 15 pounds of food after the change? In each case, draw Ashley's budget constraint before and after the change and identify her best choices.

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