

CHAPTER 3 CONSUMER BEHAVIOR

EXERCISES

2. Draw the indifference curves for the following individuals' preferences for two goods: hamburgers and beer.

a. Al likes beer but hates hamburgers. He always prefers more beer no matter how many hamburgers he has.

For Al, hamburgers are a "bad." His indifference curves slope upward and to the right rather than downward and to the left. For Al, U_1 is preferred to U_2 and U_2 is preferred to U_3 . See figure 3.2a. If you instead assumed that hamburgers were a neutral good, then the indifference curves would be vertical and utility is increasing to the right as more beer is consumed.

b. Betty is indifferent between bundles of either three beers or two hamburgers. Her preferences do not change as she consumes any more of either food.

Since Betty is indifferent between three beers and two burgers, an indifference curve connects these two points. Betty's indifference curves are a series of parallel lines with slope of $-\frac{2}{3}$. See figure 3.2b.

c. Chris eats one hamburger and washes it down with one beer. He will not consume an additional unit of one item without an additional unit of the other.

For Chris, hamburgers and beer are perfect complements, i.e., he always wants to consume the goods in fixed proportions to each other. The indifference curves are L -shaped, with corners on a 45-degree line out of the origin. See figure 3.2c.

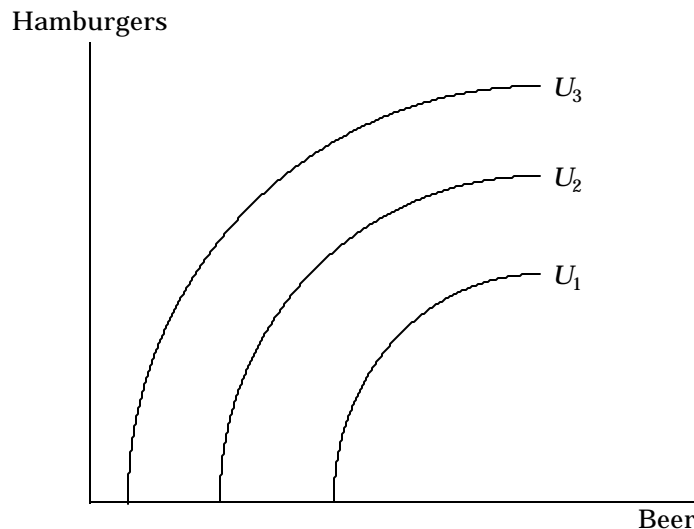


Figure 3.2.a

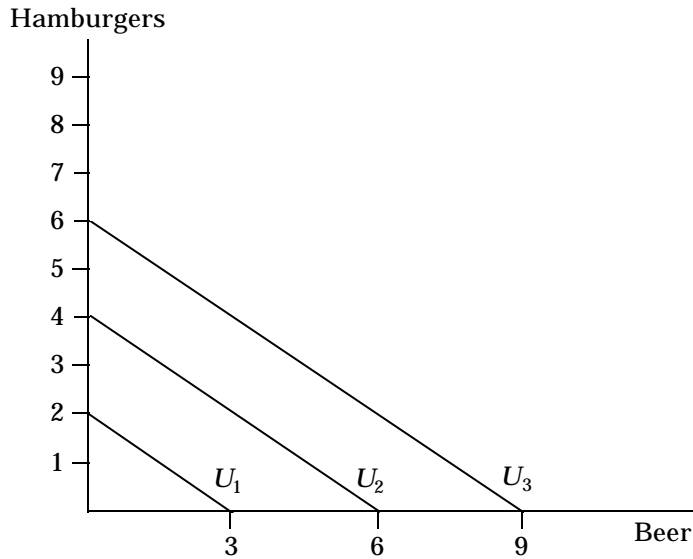


Figure 3.2.b

- d. **Doreen loves beer but is allergic to beef. Every time she eats a hamburger she breaks out in hives.**

For Doreen, hamburgers are not considered a “good” but rather a “bad,” and thus her preferred position is not upwards and to the right, but rather downward and to the right. For Doreen, U_1 is preferred to U_2 and U_2 is preferred to U_3 . See figure 3.2d.

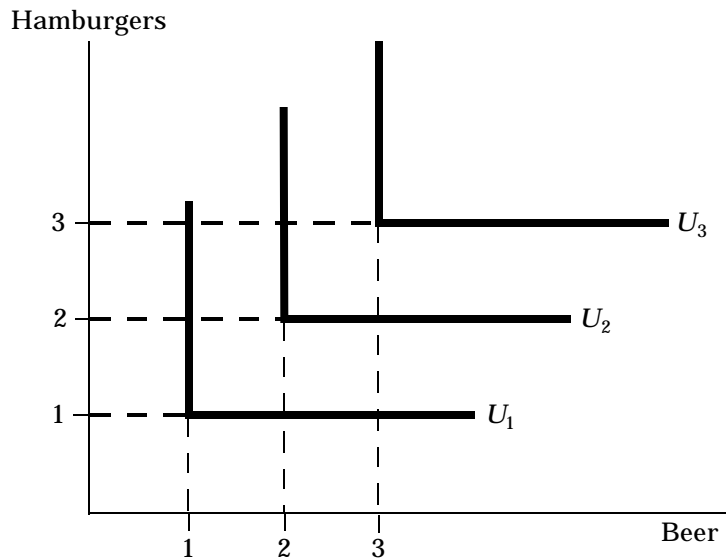


Figure 3.2.c

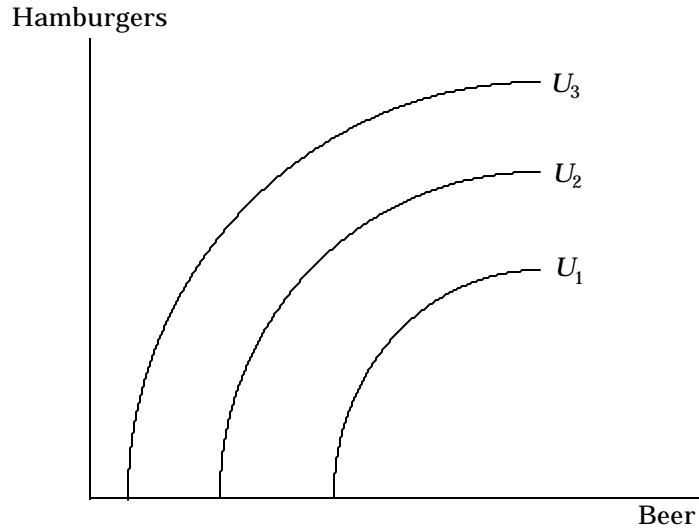


Figure 3.2.d

3. The price of tapes is \$10 and the price of CD's is \$15. Philip has a budget of \$100 and has already purchased 3 tapes. He thus has \$70 more to spend on additional tapes and CD's. Draw his budget line. If his remaining expenditure is made on 1 tape and 4 CD's, show Philip's consumption choice on the budget line.

Given Philip's remaining income of \$70, he can afford 7 tapes if he spends the entire amount on tapes, and he can afford 4.7 CD's if he spends the entire amount on CD's. According to figure 3.3, his budget line therefore intersects the vertical axis at a quantity of 7 tapes and the horizontal axis at a quantity of 4.7 CD's. Since he faces constant prices, the budget line has a constant slope and is a straight line.

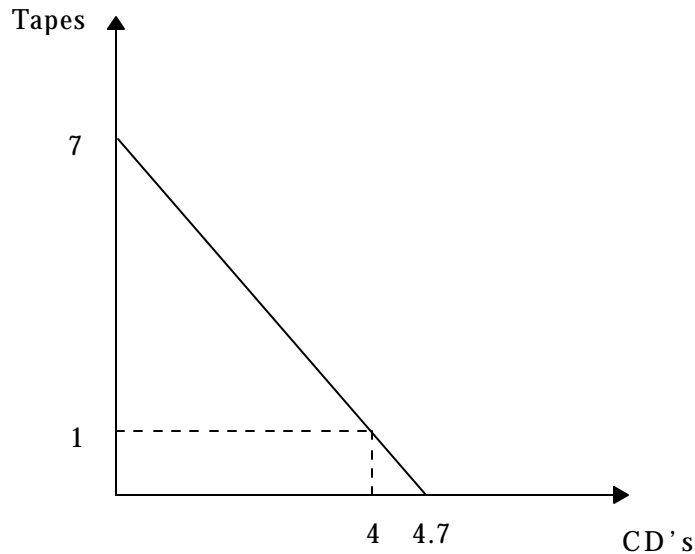


Figure 3.3

4. Debra usually buys a soft drink when she goes to a movie theater, where she has a choice of three sizes: the 8 ounce drink costs \$1.50, the 12 ounce drink, \$2.00, and the 16 ounce drink, \$2.25. Describe the budget constraint that Debra faces when deciding how many ounces of the drink to purchase. (Assume that Debra can costlessly dispose of any of the soft drink that she does not want.)

First notice that as the size of the drink increases, the price per ounce decreases.

When she buys the 8 ounce soft drink she pays $\frac{\$1.50}{8 \text{ oz}} = \0.19 per oz. When she buys

the 12 ounce size she pays \$0.17 per ounce, and when she buys the 16 ounce size, she pays \$0.14 per ounce. Given that there are three different prices per ounce of soft drink, the budget line will have two kinks in it, as illustrated in figure 3.4.

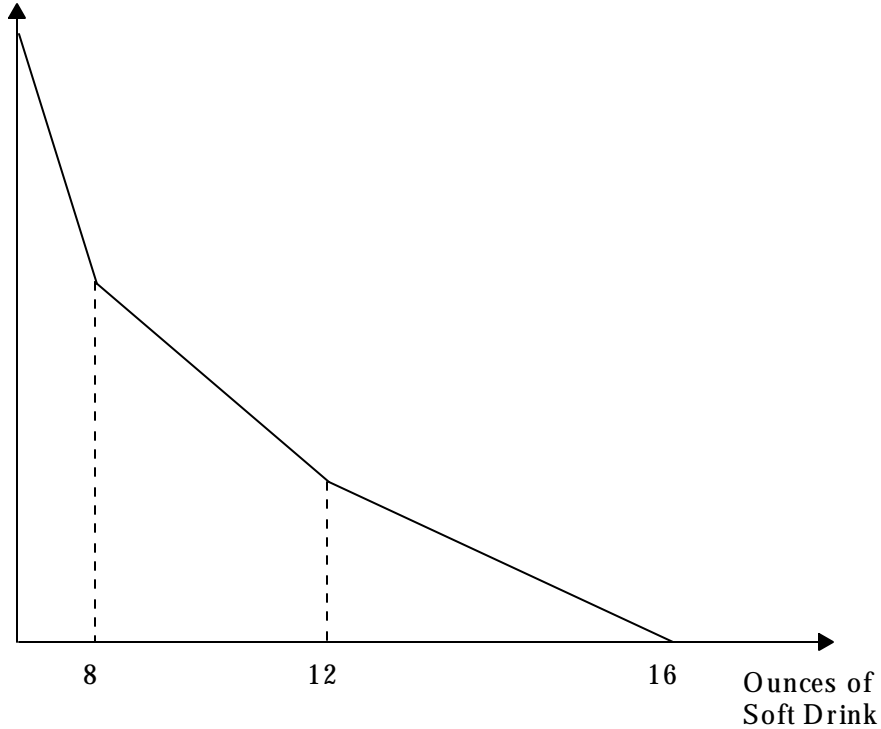


Figure 3.4

5. Suppose Bill views butter and margarine as perfectly substitutable for each other.

a. Draw a set of indifference curves that describes Bill's preferences for butter and margarine.

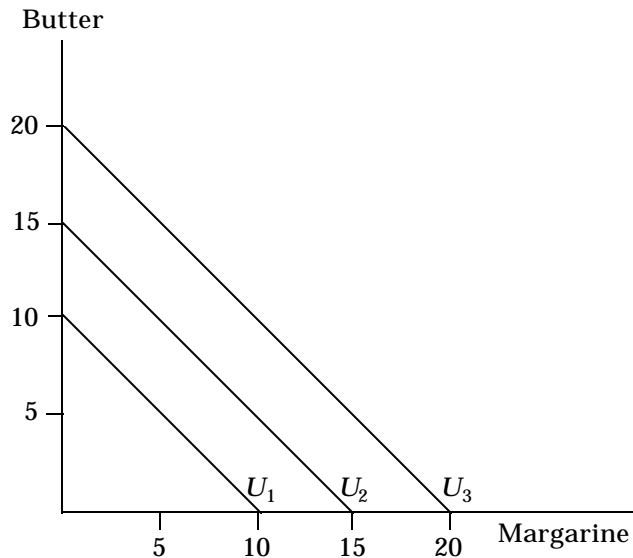


Figure 3.5.a

b. Are these indifference curves convex? Why?

Convexity implies that a line segment connecting any two points on a curve lies above the curve, i.e., the curve is “bowed inward.” Because the consumer considers butter and margarine to be perfect substitutes, there is no diminishing marginal utility, and the resultant indifference curves are straight lines. *Straight-line indifference curves are not strictly convex.*

c. If butter costs \$2 per package, while margarine costs only \$1, and Bill has a \$20 budget to spend for the month, which butter-margarine market basket will he choose? Can you show this graphically?

Let Bill’s income be represented by Y , the price of butter by P_B , the quantity of butter by B , the price of margarine by P_M , and the quantity of margarine by M . Then the general form of the budget constraint is:

$$Y = P_B B + P_M M.$$

Substituting for the given values of Y , P_B , and P_M , we obtain the specific representation of Bill’s budget constraint:

$$20 = 2B + 1M, \text{ or } B = 10 - 0.5M.$$

Because Bill is indifferent between butter and margarine, and the price of butter is greater than the price of margarine, Bill will only buy margarine. This is a *corner solution*, because the optimal choice occurs on an axis. In Figure 3.5.c Bill’s utility maximizing bundle is point A.

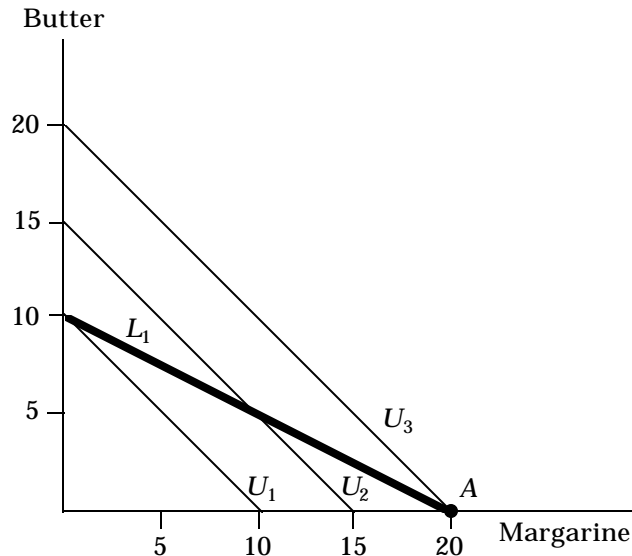


Figure 3.5.c

6. Suppose that Jones and Smith have decided to allocate \$1,000 per year on liquid refreshments in the form of alcoholic or nonalcoholic drinks. Jones and Smith differ substantially in their preferences for these two forms of refreshment. Jones prefers alcoholic to nonalcoholic drinks, while Smith prefers the nonalcoholic option.

a. Draw a set of indifference curves for Jones and a second set for Smith.

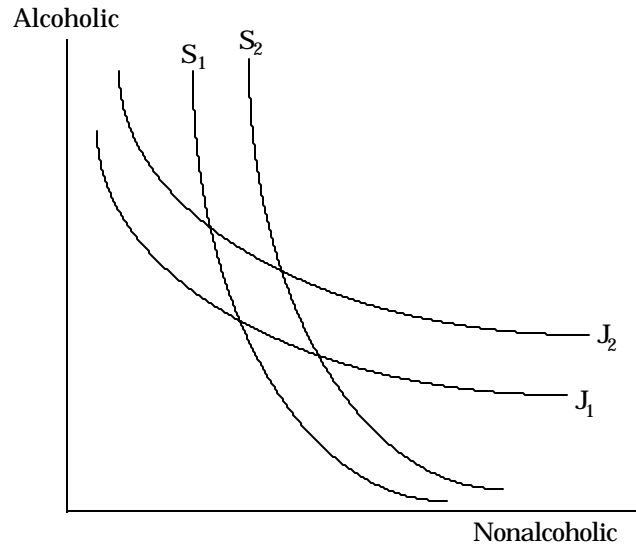


Figure 3.6.a

- b. Discuss why the two sets of curves are different from each other using the concept of marginal rate of substitution.**

At any combination of alcoholic, A , and nonalcoholic, N , drinks, Jones is willing to give up a lot of N for an additional unit of A ; whereas, Smith is willing to give up a lot of A for an additional unit of N . Because Jones needs more N to compensate him for giving up some A , he has a lower marginal rate of substitution of alcoholic for nonalcoholic beverages than Smith. With alcoholic beverages on the vertical axis, Jones' indifference curves are less steep than Smith's at any point on the graph.

- c. If both Smith and Jones pay the same prices for their refreshments, will their marginal rates of substitution of alcoholic for nonalcoholic drinks be the same or different? Explain.**

In order to maximize utility, the consumer must consume quantities such that the MRS between any two commodities is equal to the ratio of prices. If Smith and Jones are rational consumers, their MRS must be equal because they face the same market prices. But because they have different preferences, they will consume different amounts of the two goods, alcoholic and nonalcoholic. At those different levels, however, their MRS are equal.

- 9. Antonio buys 8 new college textbooks during his first year at school at a cost of \$50 each. Used books cost only \$30 each. When the bookstore announces that there will be a 20 percent price increase in new texts and a 10 percent increase in used texts for the next year, Antonio's father offers him \$80 extra. Is Antonio better off or worse off after the price change?**

It follows from the axiom of revealed preferences that, since Antonio chose to purchase only new textbooks when both new and used textbooks were available, it must be the case that Antonio does not consider used textbooks substitutes for new textbooks at the old prices.

With the increase in price, however, to \$60 for new textbooks and \$33 for used texts, the relative price of new texts to used texts increases from $\frac{50}{30} = 1.67$ to $\frac{60}{33} = 1.82$. Antonio may react to the relative price increase in one of two ways:

(1) If new and used texts are *not* substitutes for Antonio (L -shaped indifference curves), then Antonio will be just as well off when the price of new texts rises and his father gives him \$80 (= (60 - 50)8).

(2) If he chooses to buy a few used texts in response to the relative price increase (given the extra \$80), he will move to a higher indifference curve and will therefore be better off. See Figures 3.9.a and 3.9.b.

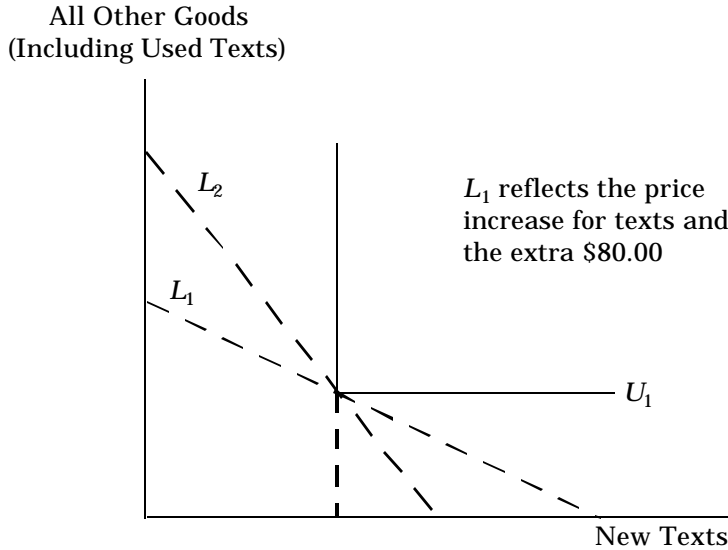


Figure 3.9.a

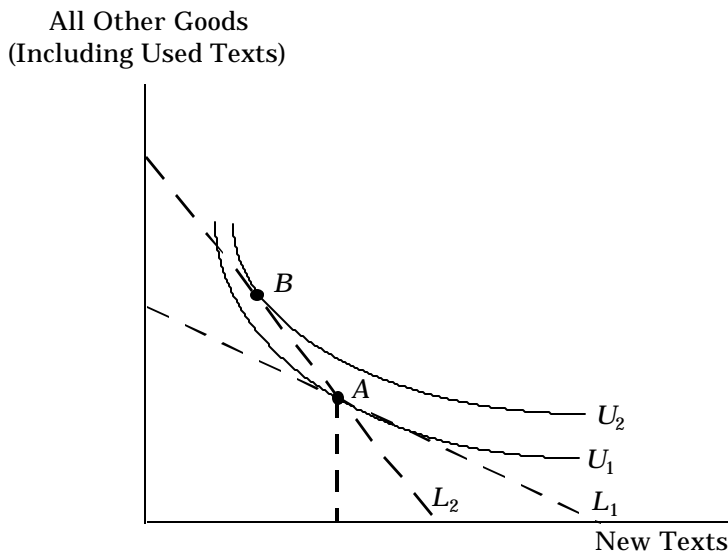


Figure 3.9.b

10. Suppose that Samantha and Jason both spend \$24 per week on video and movie entertainment. When the prices of videos and movies are both \$4, they both rent 3 videos and buy 3 movie tickets. Following a video price war and an increased cost of movie tickets, the video price falls to \$2 and the movie ticket increases to \$6. Samantha now rents 6 videos and buys 2 movie tickets; Jason, however, buys 1 movie ticket and rents 9 videos.

a. Is Samantha better off or worse off after the price change?

Samantha's original point of utility maximization may be represented by point A on U_1 in Figure 3.10.a. With the new prices, Samantha could still afford to choose bundle A:

$\$24 = \$2(3 \text{ videos}) + \$6 (3 \text{ movies})$. The fact that she chose bundle B reveals she has obtained a higher level of utility, U_2 . See Figure 3.10.a.

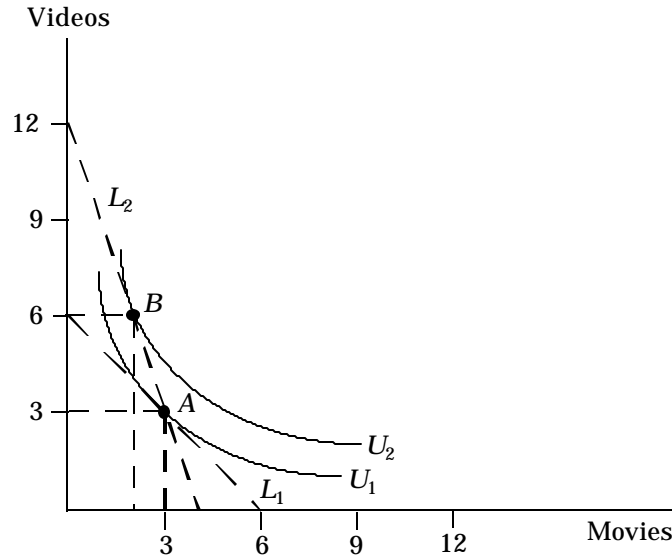


Figure 3.10.a

b. Is Jason better off or worse off?

Similarly, Jason must also be better off.

11. Connie Consumer has a monthly income of \$200 which she allocates among two goods: meat and potatoes.

a. Suppose meat costs \$4 per pound and potatoes cost \$2 per pound. Draw her budget constraint.

Let M = meat and P = potatoes. Connie's budget constraint is

$$\$200 = 4M + 2P, \text{ or}$$

$$M = 50 - 0.5P.$$

As shown in Figure 3.11.a, with M on the vertical axis, the vertical intercept is 50. The horizontal intercept may be found by setting $M = 0$ and solving for P .

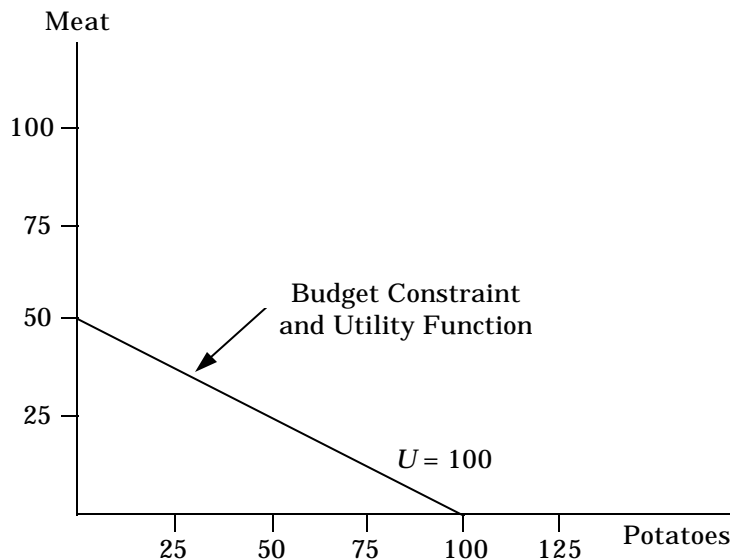


Figure 3.11.a

- b. **Suppose also that her utility function is given by the equation $u(M, P) = 2M + P$. What combination of meat and potatoes should she buy to maximize her utility? (Hint: Meat and potatoes are perfect substitutes.)**

Connie's utility is equal to 100 when she buys 50 pounds of meat and no potatoes or no meat and 100 pounds of potatoes. The indifference curve for $U = 100$ coincides with her budget constraint. Any combination of meat and potatoes along this line will provide her with maximum utility.

- d. **An outbreak of potato rot raises the price of potatoes to \$4 per pound. The supermarket ends its promotion. What does her budget constraint look like now? What combination of meat and potatoes maximizes her utility?**

With the price of potatoes at \$4, Connie may buy either 50 pounds of meat or 50 pounds of potatoes, or some combination in between. See Figure 3.11.d. She maximizes utility at $U = 100$ at point A when she consumes 50 pounds of meat and no potatoes. *This is a corner solution.*

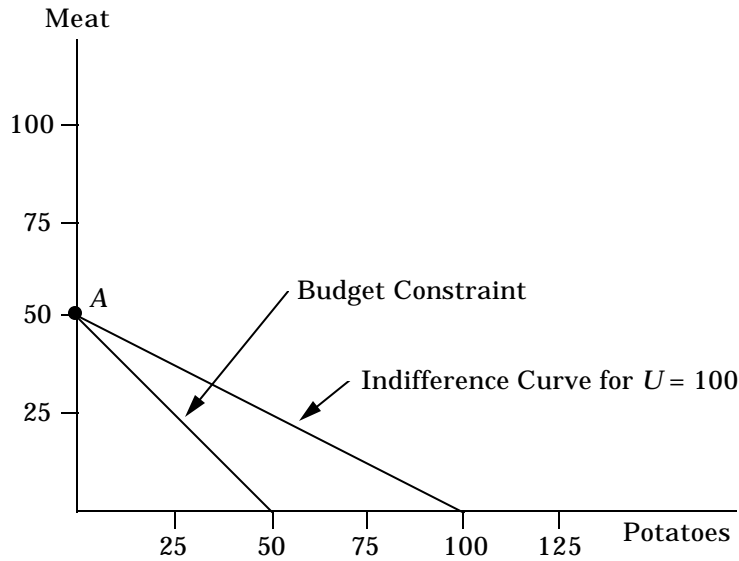


Figure 3.11.d

12. **The utility that Jane receives by consuming food F and clothing C is given by: $u(F,C) = FC$.**

- a. **Draw the indifference curve associated with a utility level of 12 and the indifference curve associated with a utility level of 24. Are the indifference curves convex?**

To find the baskets of food, F , and clothing, C , which yield satisfactions of 12 and 24 solve the equations $C = \frac{12}{F}$ and $C = \frac{24}{F}$.

$U = 12$		$U = 24$	
Food	Clothing	Food	Clothing
1.0	12.0	1.0	24.0
1.5	8.0	2.0	12.0
2.0	6.0	3.0	8.0
3.0	4.0	4.0	6.0

4.0	3.0	6.0	4.0
6.0	2.0	8.0	3.0
8.0	1.5	12.0	2.0
12.0	1.0	24.0	1.0

The indifference curves are convex.

- b. Suppose that food costs \$1 a unit, clothing costs \$3 a unit, and Jane has \$12 to spend on food and clothing. Graph the budget line that she faces.**

The budget constraint is:

$$Y = P_F F + P_C C, \text{ or}$$

$$12 = 1F + 3C, \text{ or } C = 4 - \left(\frac{1}{3}\right)F.$$

See Figure 3.12.a.

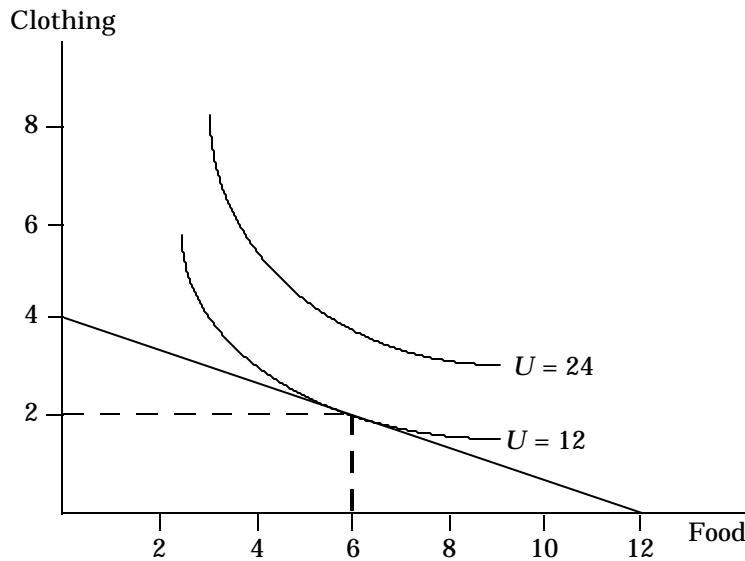


Figure 3.12.a

- c. What is the utility-maximizing choice of food and clothing? (Hint: Solve the problem graphically.)**

The highest level of satisfaction occurs where the budget line is tangent to the highest indifference curve. In Figure 3.12.a this is at the point $F = 6$ and $C = 2$. To check this answer, note that it exhausts Jane's income, $12 = 6P_F + 2P_C$. Also, this bundle yields a satisfaction of 12, as $(6)(2) = 12$. See Figure 3.12.a.

- d. What is the marginal rate of substitution of food for clothing when utility is maximized?**

At the utility-maximizing level of consumption, the slope of the indifference curve is equal to the slope of the budget constraint. Since the MRS is equal to the negative slope of the indifference curve, the MRS in this problem is equal to one-third. Thus, Jane would be willing to give up one-third of a unit of clothing for one unit of food.

- e. **Suppose that Jane buys 3 units of food and 3 units of clothing with her \$12 budget. Would her marginal rate of substitution of food for clothing be greater or less than 1/3? Explain.**

If Jane buys 3 units of food for \$1.00 per unit and 3 units of clothing for \$3.00 per unit, she would spend all her income. However, she would obtain a level of satisfaction of only 9, which represents a sub-optimal choice. At this point, the *MRS* is greater than one-third, and thus, at the prices she faces, she would welcome the opportunity to give up clothing to get more food. She is willing to trade clothing for food until her *MRS* is equal to the ratio of prices. See Figure 3.12.e.

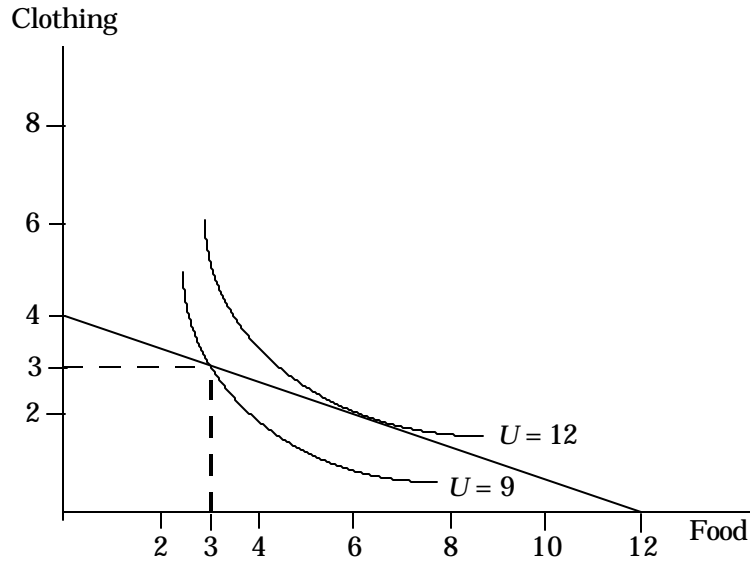


Figure 3.12.e