
Chapter 4: Answers to Questions and Problems

1.

a. The market rate of substitution is $-\frac{P_x}{P_y} = -\frac{10}{40} = -0.25$.

b. See Figure 4-1.

c. Increasing income to \$800 (by \$400) expands the budget set, as shown in Figure 4-1. Since the slope is unchanged, so is the market rate of substitution.

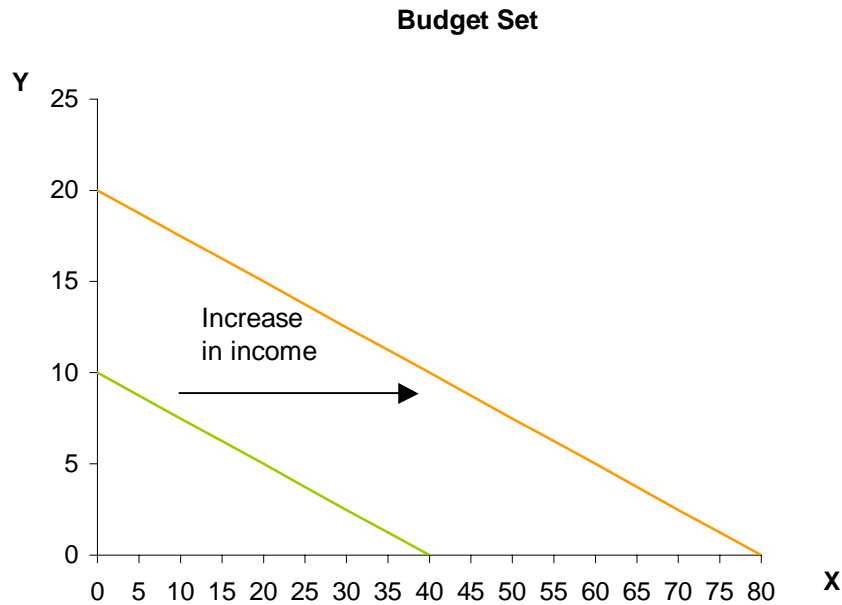


Figure 4-1

2.

- a. The consumer's budget line is $\$250 = \$5X + \$10Y$. Rearranging terms and solving for Y results in $Y = 25 - 0.5X$.
- b. See in Figure 4-2.
- c. When the price of X increases to \$10, the budget line becomes $\$250 = \$10X + \$10Y$, which is equivalent to $Y = 25 - X$ (after rearranging and simplifying terms). This is shown in Figure 4-2. The market rate of substitution changes from $-\frac{P_x}{P_y} = -\frac{5}{10} = -\frac{1}{2}$ to $-\frac{P_x}{P_y} = -\frac{10}{10} = -1$.

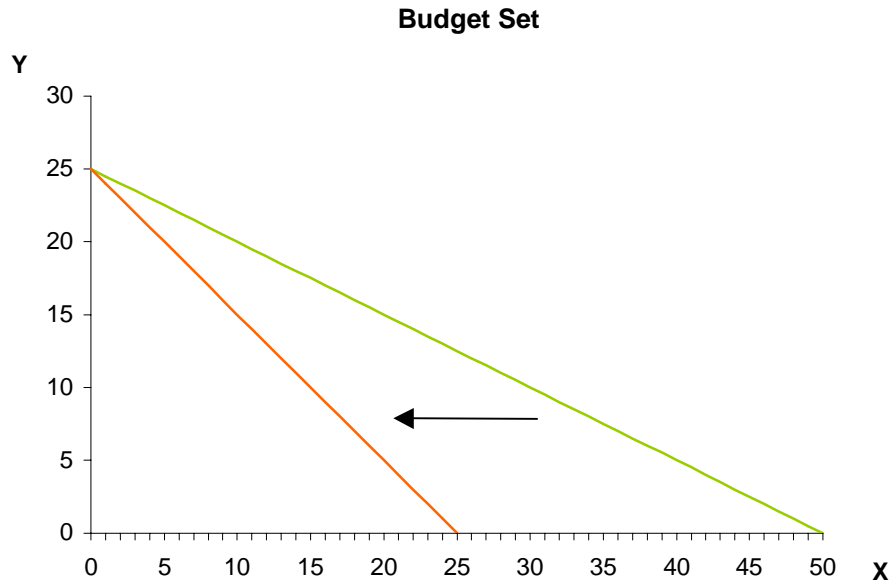


Figure 4-2

3.

- a. Since the slope of the line through point A is $-\frac{20}{20} = -1$ and the price of good X is \$5, it follows that $P_y = 5$.
- b. If the consumer spends all her income on good X she can purchase 20 units. Since these units cost \$5 each, her income must be \$100.
- c. At point A, the consumer spends $(\$5)(10) = \50 on good Y, which means that the remaining $\$100 - \$50 = \$50$ is being spent on good X. Since good X costs \$5 per unit, point A corresponds to 10 units of good X.
- d. The price of good Y decreased to \$2.50. The consumer achieves a higher level of satisfaction at point B.

4. This is not always the case. For instance, if the consumer was initially consuming more of the inferior good than a gift certificate would purchase, then less of the inferior good will be consumed when given a gift certificate.

5. A half-price sale cuts the price of each and every unit in half. In contrast, a buy-one, get-one-free deal does not change the relative price of any units between 0 and 1 unit. Furthermore, it makes the price of units purchased between 1 and 2 units purchased zero.
- 6.
- $P_x = \$50$, $P_y = \$100$ and $M = \$300$.
 - $\frac{M}{P_y} = \frac{300}{100} = 3$ units.
 - $\frac{M}{P_x} = \frac{300}{50} = 6$ units.
 - 1 unit (since the \$50 gift certificate will purchase exactly one unit of good X).
 - $\frac{M + \$50}{P_x} = \frac{350}{50} = 7$ units.
 - D, B, C, A.
 - Normal.
- 7.
- Consumption of good X will decrease and consumption of good Y will increase.
 - Consumption of good X will decrease and consumption of good Y will increase.
 - Nothing will happen to the consumption of either good.
 - Consumption of good X will increase and consumption of good Y will decrease.
8. All properties hold except *Property 4-3* (“Diminishing Marginal Rate of Substitution”) and *Property 4-2* (“More is Better”).
9. These preferences do not exhibit a diminishing marginal rate of substitution since consumers are always willing to substitute the same amount of store-brand sugar for an additional pound of producer-brand sugar. When store-brand sugar is \$1 per pound and producer-brand sugar is \$2 per pound, the consumer will purchase 10 pounds of store-label sugar and no producer-brand sugar. After the change, the consumer will purchase no store-label sugar and 10 pounds of producer-brand sugar.

10. See Figure 4-3. When there is no food stamp program, the market rate of substitution is -0.5 . The Food Stamp program leaves the market rate of substitution unchanged, and a consumer can purchase \$170 of food without spending her income. A dollar-for-dollar exchange of food stamps for money further expands a consumer's opportunity set, potentially making her better off.

Budget Constraint with and without Food Stamps

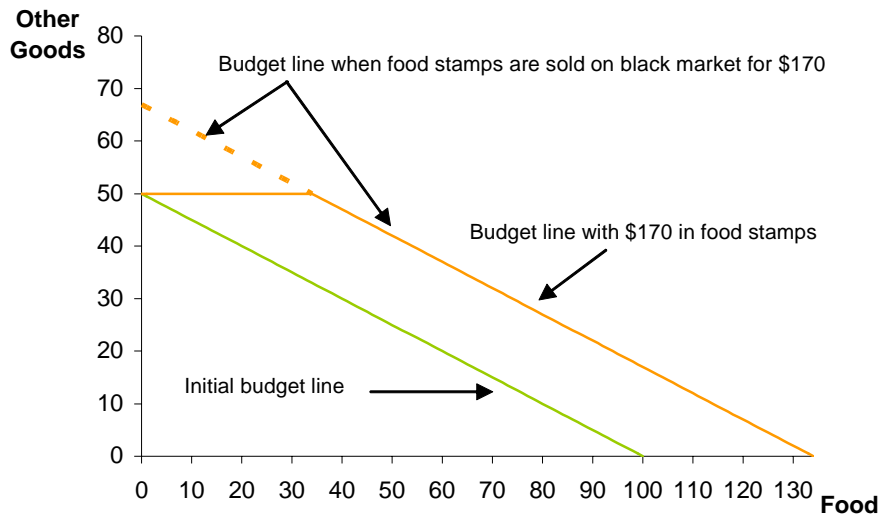


Figure 4-3

11. See Figure 4-4. The offer expands the consumer's budget set and allows her to purchase more tires.

Budget Set with and without Buy 3, Get 4th Free Offer

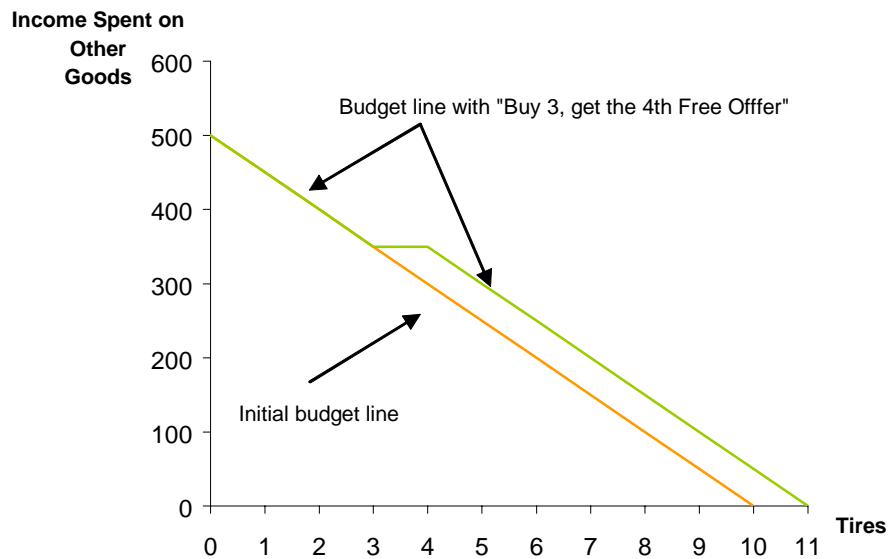


Figure 4-4

12. See Figure 4-5. The initial market rate of substitution is -0.5 . Since, after the price decrease, the $MRS = -1 \neq -0.625 = -\frac{P_{EM}}{P_T}$ (where P_{EM} is the price of electronic media and P_T the price of travel) equilibrium has not been achieved. To reach equilibrium, the business should increase its use of electronic media and decrease travel.

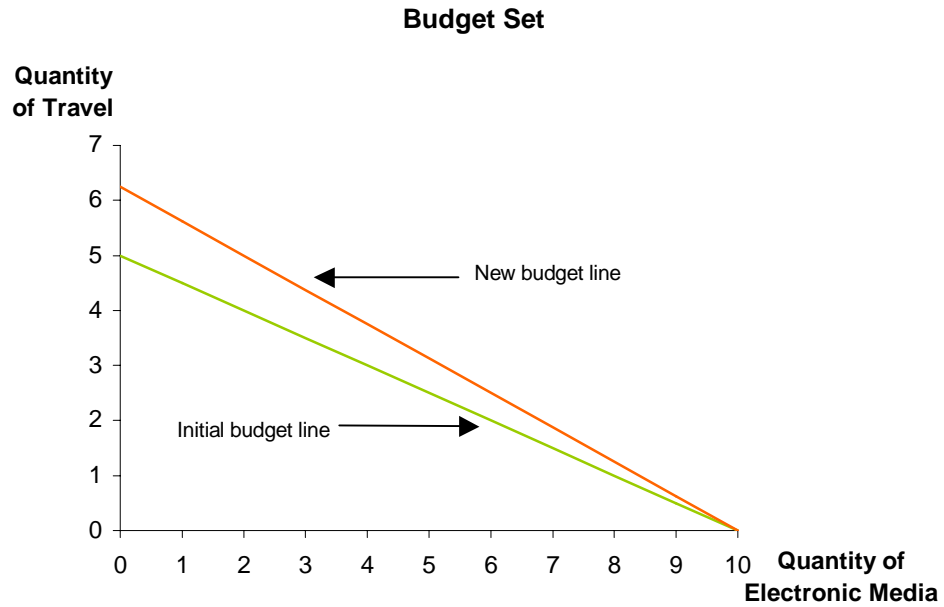


Figure 4-5

13. The impacts on the consumer's budget sets are illustrated in Figure 4-6. As is shown in the diagram, if the consumer has a strong preference for other goods (so that the preferred quantity of other goods is greater than 7 units), the cash is preferred even though it is taxed. Otherwise, the non-taxable, employer-sponsored health insurance program allows an employee to achieve a higher indifference curve.

Budget Line with Employer Sponsored Health Insurance

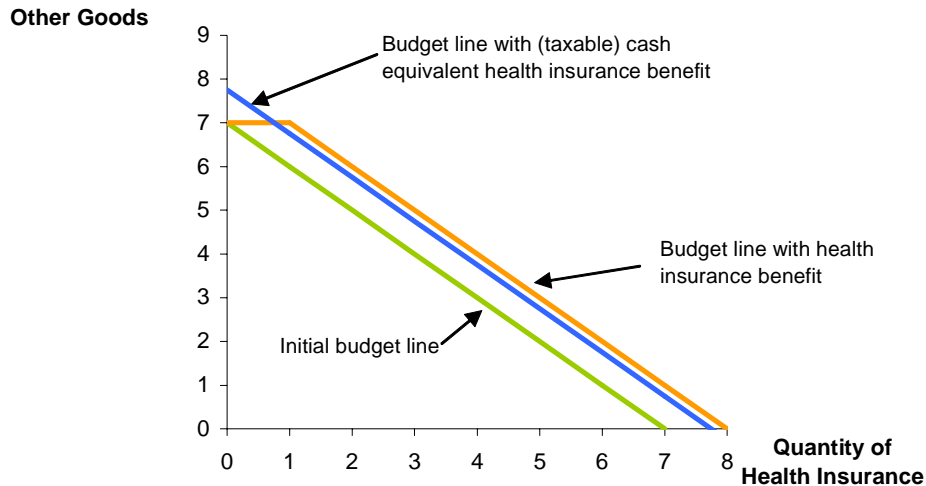


Figure 4-6

14. Under the existing plan, a worker that does not “goof off” produces 3 copiers per hour and thus is paid \$9 each hour. Under the new plan, each worker would be paid a flat wage of \$8 per hour. While it might appear on the surface that the company would save \$1 per hour in labor costs by switching plans, the flat wage would be a lousy idea. Under the current plan, workers get paid the \$9 only if they work hard during the hour and produce 3 machines that pass inspection. Under the new plan, workers would get paid \$8 an hour regardless of how many units they produce. Since your firm has no supervisors to monitor the workers, you should not favor the plan.

15. As shown in Figure 4-7, the budget line when more than 10 dozen bagels are purchased annually under the frequent buyer program is always greater than the budget line when the firm sells each dozen bagels at a 3 percent discount. However, the budget line for consumers who purchase fewer than 10 dozen bagels per year is greater under the 3 percent per dozen discount.

Comparison of Budget Lines Under Different Offers

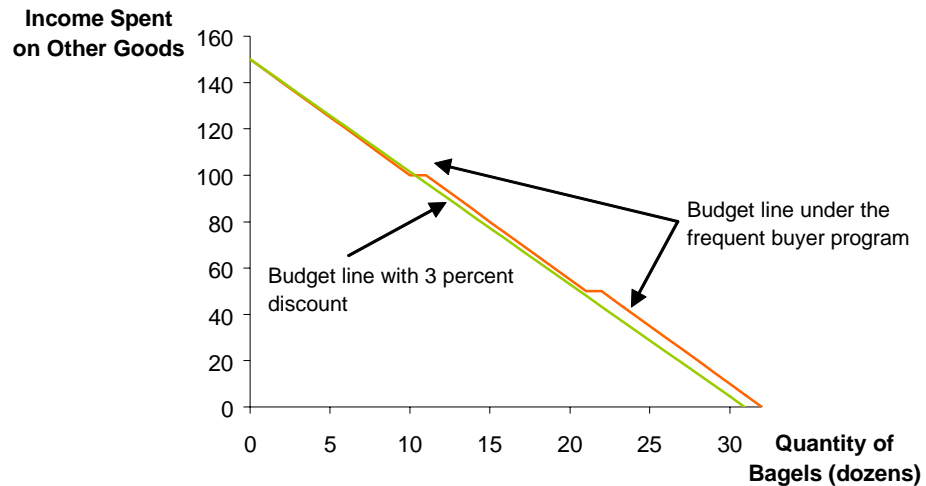


Figure 4-7

16. Yes. Since pizza is an inferior good, if the consumer is given \$30 in cash she will definitely spend it entirely on CDs – just as she would if given a \$30 gift certificate at a local music store.

17. Figure 4-8 illustrates a consumer's budget line when a firm offers a "quantity discount." A consumer will never purchase exactly 8 bottles of wine, since at this kink in the opportunity set the consumer would always be better off by buying more or less wine.

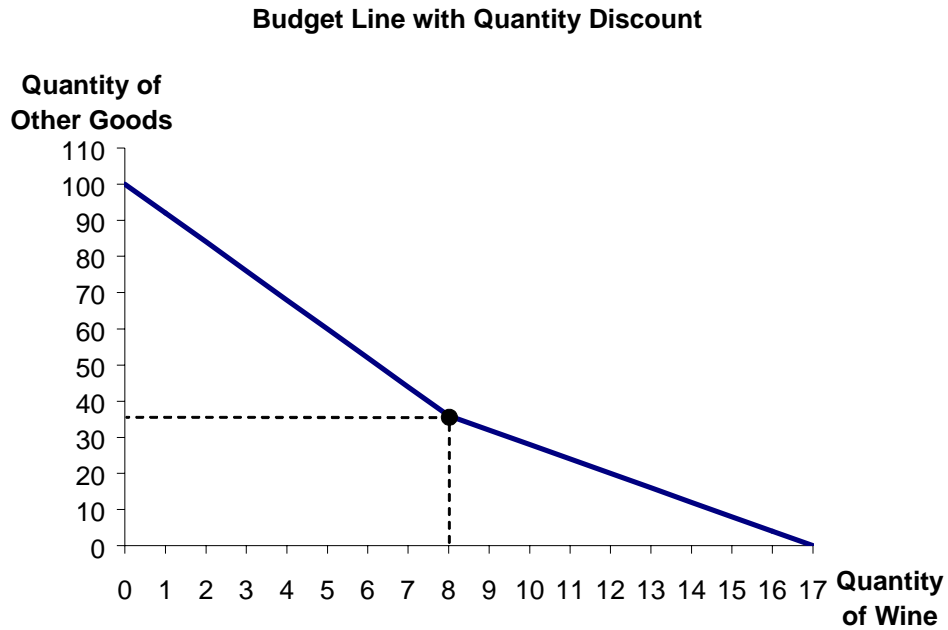


Figure 4-8

18. Figure 4-9 contains CACI's profit as a function of output. Output when managers are compensated based solely on output is 25 units and profits are zero. In contrast, when managers' compensation is based solely on profits, output is 12.5 units and profits are \$156.25. When managers' compensation is based on a combination of output and profit, output ranges between 12.5 and 25 units and profit will be between zero and \$156.25. The exact combination of output and profit depends on how these variables are weighted.

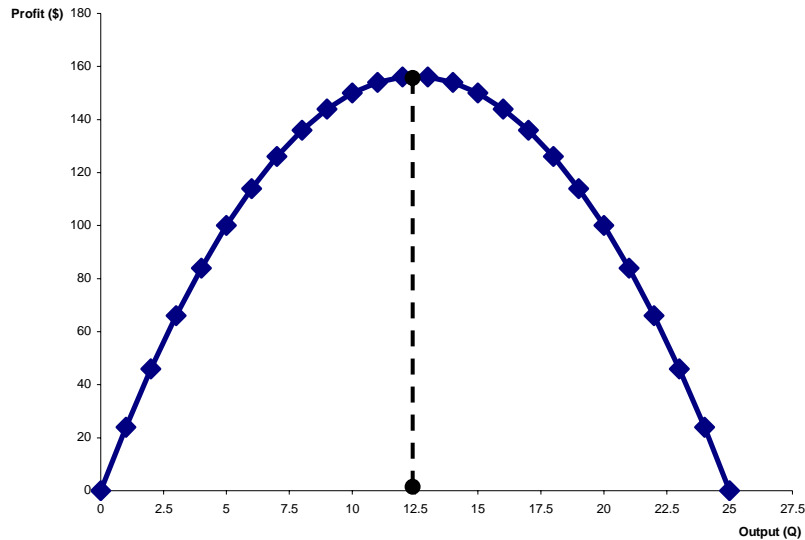


Figure 4-9

19. Figures 4-10a and 4-10b, respectively, illustrate Albert's and Sid's opportunity sets. Since there are 24 hours per day, at the new wage rate of \$18 per hour Albert will supply 12 hours of labor per day (24-12), and Sid will supply 8 hours of labor per day (24-16). This seemingly contradictory result is explained by decomposing the wage change into the substitution effect and income effect. The diminishing marginal rate of substitution between income and leisure implies that the substitution effect will increase the amount of leisure consumed by each worker (decrease the amount of labor supplied). Since after the wage change Albert is observed consuming less leisure (supplying more labor), the income effect dominates the substitution effect. In contrast, the substitution effect dominates the income effect for Sid; since Sid is observed consuming more leisure (supplying less labor) after the wage change.

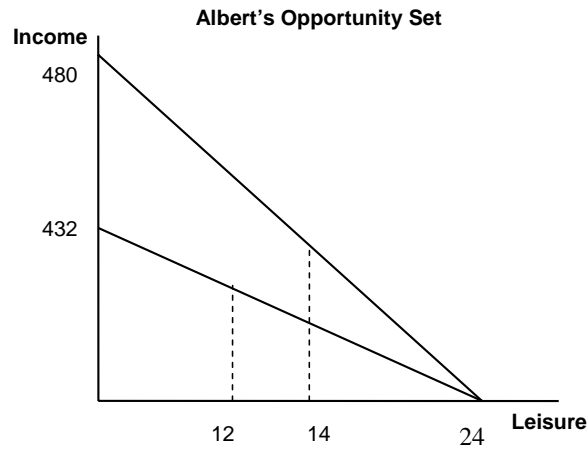


Figure 4-10a

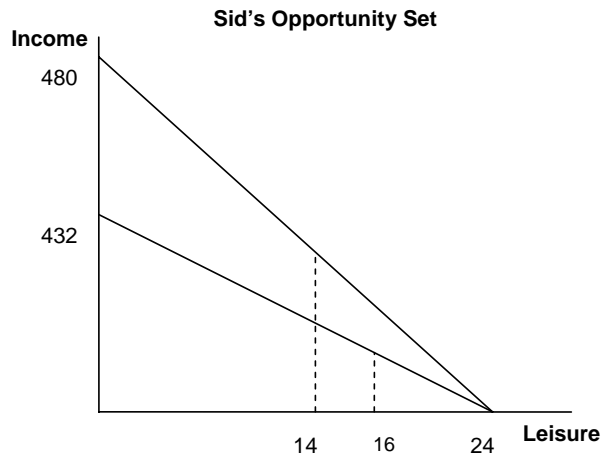


Figure 4-10b