Answers to the Problems – Chapter 7

1. a. To draw a graph of Jason's budget line, plot the number of DVDs on the *x*-axis and the number of spy novels on the *y*-axis. The budget line will go through the vertical intercept of 6 spy novels, 0 DVDs and the horizontal intercept of 3 DVDs and 0 spy novels. Combinations of spy novels and DVDs within and on the budget line are affordable; combinations that lie beyond the budget line are not affordable. The figure will look similar to Fig. 7.1.

   b. Jason's real income in terms of spy novels is 6 spy novels.

   c. The relative price of a DVD is $20 per DVD ÷ $10 per spy novel, which is 2 spy novels per DVD.

2. a. To draw a graph of Jason's budget line, plot the number of DVDs on the *x*-axis and the number of spy novels on the *y*-axis. The new budget line will go through the vertical intercept of 9 spy novels, 0 DVDs and the horizontal intercept of 4.5 DVDs and 0 spy novels. It will have the same slope as the budget line in problem 1 but will lie farther from the origin. The figure will look similar to Fig. 7.1.

   b. Jason's real income in terms of spy novels is 9 spy novels.

   c. The relative price of a DVD has not changed; it remains $20 per DVD ÷ $10 per spy novel, which is 2 spy novels per DVD.

3. a. To draw a graph of Jason's budget line, plot the number of DVDs on the *x*-axis and the number of spy novels on the *y*-axis. The new budget line will go through the vertical intercept of 9 spy novels, 0 DVDs and the horizontal intercept of 6 DVDs and 0 spy novels. The figure will look similar to Fig. 7.1. Compared to the budget line in problem 2, the vertical intercept is the same and the horizontal intercept has moved further out along the *x*-axis.

   b. Jason's real income in terms of DVDs is 6 DVDs.

   c. Jason's real income in terms of spy novels has not changed from problem 2; it remains 9 spy novels.

   d. The relative price of a DVD is $15 per DVD ÷ $10 per spy novel, which is 1.5 spy novels per DVD.

4. a. To draw a graph of Jason's total utility from DVDs, plot the number of DVDs on the *x*-axis and Jason's utility from DVDs on the *y*-axis. The curve will look similar to Fig. 7.3(a). To draw a graph of Jason's total utility from spy novels, repeat the above procedure but use the spy novel data.

   b. Jason gets more utility from any number of DVDs than he does from the same number of spy novels.

   c. To draw a graph of Jason's marginal utility from DVDs plot the number of DVDs on the *x*-axis and Jason's marginal utility from DVDs on the *y*-axis. The curve will look similar to Fig. 7.3(b). To draw a graph of Jason's marginal utility from spy novels, repeat the above procedure but use the spy novel data.
   Jason's marginal utility from DVDs is the increase in total utility he gets from one additional DVD. Similarly, Jason's marginal utility from spy novels is the increase in total utility he gets from one additional spy novel.

   d. Jason gets more marginal utility from an additional DVD than he gets from an additional spy novel when he has the same number of each.

   e. Jason buys 2 DVDs and 2 spy novels.

When Jason buys 2 DVDs and 2 spy novels he spends $60. Jason maximizes his utility when he spends all of his money and the marginal utility per dollar spent on DVDs and spy novels is the same. When Jason buys 2 DVDs his marginal utility per dollar spent is 2.5 units per dollar and when Jason buys 2 spy novels his marginal utility per dollar spent is 2.5 units per dollar.

5. To maximize his utility, Max windsurfs for 3 hours and snorkels for 1 hour.
Max will spend his $35 such that all of the $35 is spent and that the marginal utility per dollar spent on each activity is the same. When Max windsurfs for 3 hours and snorkels for 1 hour, he spends $30 renting the windsurfing equipment and $5 renting the snorkeling equipment—a total of $35.
The marginal utility from the third hour of windsurfing is 80 and the rent of the windsurfing equipment is $10 an hour, so the marginal utility per dollar spent on windsurfing is 8. The marginal utility from the first hour of snorkeling is 40 and the rent of the snorkeling equipment is $5 an hour, so the marginal utility per dollar spent on snorkeling is 8. The marginal utility per dollar spent on windsurfing equals the marginal utility per dollar spent on snorkeling.

6. a. Max's consumption possibilities line is a straight line that runs from 5.5 hours windsurfing and 0 hours snorkeling to 11 hours snorkeling and 0 hours windsurfing.
Max's possibilities line shows the various combinations of hours spent snorkeling and hours spent windsurfing that has a total expenditure of $55. Windsurfing is $10 an hour, so if Max spends all his money on windsurfing, he can windsurf for 5.5 hours.
Snorkeling is $5 an hour, so if Max spends all his money on snorkeling, he can snorkel for 5.5 hours.

   b. To maximize his utility, Max windsurfs for 4 hours and snorkels for 3 hours.
Max will spend his $55 such that all of the $55 is spent and that the marginal utility per dollar spent on each activity is the same. When Max windsurfs for 4 hours and snorkels for 3 hours, he spends $40 renting the windsurfing equipment and $15 renting the snorkeling equipment—a total of $55.
The marginal utility from the fourth hour of windsurfing is 60 and the rent of the windsurfing equipment is $10 an hour, so the marginal utility per dollar spent on windsurfing is 6. The marginal utility from the third hour of snorkeling is 30 and the rent of the snorkeling equipment is $5 an hour, so the marginal utility per dollar spent on snorkeling is 6. The marginal utility per dollar spent on windsurfing equals the marginal utility per dollar spent on snorkeling.

7. To maximize his utility, Max windsurfs for 6 hours and snorkels for 5 hours. Max will use his $55 such that all of the $55 is spent and that the marginal utility per dollar spent on each activity is the same. When Max windsurfs for 6 hours and snorkels for 5 hours, he spends $30 renting the windsurfing equipment and $25 renting the snorkeling equipment—a total of $55.
The marginal utility from the sixth hour of windsurfing is 12 and the rent of the windsurfing equipment is $5 an hour, so the marginal utility per dollar spent on windsurfing is 2.4. The marginal utility from the fifth hour of snorkeling is 12 and the rent of the snorkeling equipment is $5 an hour, so the marginal utility per dollar spent on snorkeling is 2.4. The marginal utility per dollar spent on windsurfing equals the marginal utility per dollar spent on snorkeling.

8. To maximize his utility, Max windsurfs for 5 hours and snorkels for 1 hour.
Because the equipment is free, Max does not have to allocate his *income* between the two activities; instead, he allocates his *time* between the two activities. Max spends 6 hours on these activities. Max allocates the 6 hours such that the marginal utility from each activity is the same. When Max windsurfs for 5 hours and snorkels for 1 hour, he spends 6 hours. His marginal utility

from the fifth hour of windsurfing is 40 and his marginal utility from the first hour of snorkeling is 40—so the marginal utilities are equal.

9. a. Two points on Max's demand curve for renting windsurfing equipment are a price of $10 per hour and a quantity of 4 hours windsurfing (from problem 6), and a price of $5 per hour and a quantity of 6 hours of windsurfing (from problem 7).
   b. Max's demand curve is drawn in figure with the rental price of windsurfing equipment on the vertical axis and the quantity of hours he windsurfs on the horizontal axis. The demand curve is a downward sloping line going through the points $10 per hour/4 hours and $5 per hour/6 hours.
   c. Between the two points on the demand curve in part b, Max's elasticity of demand for windsurfing is equal to 0.60. Max's demand is inelastic between these two points. The total expenditure test gives the same result: The fall in price decreases Max's total expenditure on windsurfing.

10. a. Max's demand for snorkeling increases. The quantity demanded at a price of $5 per hour for snorkeling equipment increases from 3 hours (problem 6) to 5 hours (problem 7).
    b. Max's demand curve is drawn in figure with the rental price of snorkeling equipment on the vertical axis and the quantity of hours he snorkels on the horizontal axis. The initial demand curve is a downward sloping line that goes through the point $5 per hour/3 hours. The second demand curve is a downward sloping line lying rightward of the original demand curve that goes through the point $5 per hour/5 hours.
    c. Max's cross elasticity of demand for snorkeling with respect to the price of windsurfing equipment is equal to –0.75.
    d. Max's cross elasticity of demand is negative, so the two goods are complements.

11. a. Max's demand for windsurfing equipment increases and his demand curve for windsurfing equipment shifts rightward. The quantity demanded at a price of $10 per hour for windsurfing equipment increases from 3 hours (problem 5) to 4 hours (problem 6).
    b. Max's demand for snorkeling equipment increases and his demand curve for snorkeling equipment shifts rightward. The quantity demanded at a price of $5 per hour for snorkeling equipment increases from 1 hour (problem 5) to 3 hours (problem 6).
    c. Renting windsurfing equipment is a normal good for Max because his demand increased when his income increased.
    d. Renting snorkeling equipment is a normal good for Max because his demand increased when his income increased.

12. a. In total, water is move valuable to Ben because water has a (much!) higher total utility. On the marginal, an additional bunch of flowers has larger marginal utility than does an additional 1,000 gallon of water.
    b. Flowers are more expensive than water even though water is essential to life. The reason flowers are more expensive is because People, such as Ben, consume fewer flowers than they do water. Because people consume so much water, its marginal utility is quite low even though its total utility is tremendous. Because so few flowers are consumed, their marginal utility is relatively high even though their total utility is small. Prices, though, reflect the marginal utility of the good and so flowers are more expensive than water.

Critical Thinking

1. a. The new child-care technology lowers the price of childcare per child. Indeed, using the numbers in the article, if the wages paid Todd Cole and Michael Vick do not change, then

the price of child care per child falls from $2,731 to $218.50. With Mr. Vick's price of services for customer remaining at $13, Mr. Cole is worth only 17 times as Mr. Vick, so the marginal utility of child care workers falls. Ad blocking technology, however, will lower Mr. Vick's salary. It is unlikely, though, that it would lower it by more than a factor of 12.5 (the amount Mr. Cole's price per child fell), so Mr. Cole will be worth less than 210 times as much as Mr. Vick (the initial situation) and more than 17 times (the situation of no ad blocking technology existed).

b. The supply of child-care services increases, thereby lowering the wage rate of a child-care worker.

c. The number of workers employed in child-care decreases.

d. The new ad blocking technology lowers the salary paid Michael Vick. The amount by which it falls is unclear, but it is clear that Mr. Vick's price of services per customer falls. As worked out in the answer to part a, Todd Cole's price per customer served also falls. It is likely, however, that Mr. Cole's price per customer falls more than Mr. Vick's price per customer. Regardless, the marginal utility of football players falls.

e. The demand for football players decreases, so the salary paid football players falls.

f. The number of football players decreases. (The number in the NFL might stay constant, but in other "minor" leagues the number decreases.)

2. a. The ban decreases the utility of smokers because they can no longer smoke.
   b. Because the ban decreases the marginal utility of traveling by air, smokers will decrease their demand for air travel.
   c. Presumably the ban increases the utility of non-smokers because they do not have inhale nor smell the smoke. In addition, it might increase their utility because they know they are no longer being affected by "second-hand smoke."
   d. Because the ban increases the marginal utility of traveling by air, non-smokers will increase their demand for air travel.

Web Activities

1. When Coca-Cola introduced their bottled water, Dasani, Coca-Cola said it was a "purified still water 'enhanced with minerals for a pure, fresh taste.'" The idea of "enhancing" the water for a "fresh taste" was to increase the marginal utility a consumer derives from drinking the water. For a given price, the higher the marginal utility, the higher the marginal utility per dollar and hence the larger the number of bottles of water consumed. Coca-Cola also said "Consumer (research) finds purified water is equally attractive as spring water." Their meaning here is that consumers find the marginal utility from a bottle of purified water to be the same as the marginal utility from a bottle of spring water, so for consumers these goods are perfect substitutes. Hence Coca-Cola's profit is higher if they can produce a bottle of purified water at lower cost than they could produce a bottle of spring water.

2. a. There are a variety of ticket options. In general, the consumer wants to spend the minimum amount for a ride because that increases the consumer's consumption possibilities. So, for instance, a one-way fare token is the least expensive if the consumer takes only a few rides a month and fewer than 3 rides on any given day. This pass makes the consumer's rides as inexpensive as possible and so makes the consumer's consumption possibilities as large as possible. But, if the consumer takes 3 or more rides a day for 5 or more days a week, a weekly pass minimizes the cost of a ride and maximizes the consumption possibilities. Similarly, a monthly pass is best if the consumer rides more frequently.

   b. The person wants to maximize his or her consumption possibilities by paying the least per ride. The decision whether to buy a day pass or a pass for a longer period of time depends on

how many days the person rides. If the person rides for 5 or more days per week, a weekly pass has a lower per-ride price than a day pass, so the marginal utility per dollar spent on rides is greater buying a weekly pass.

c. If the price of a single trip fell and the price of a day pass increased, the number of riders would decrease. *After* a person has purchased a day pass, all rides that day have a price of zero. So the person takes a ride even if the marginal utility from the ride is low because the price of the additional ride is zero. Lowering the price of a single trip and raising the price of a day price makes people less likely to buy a day pass and so decreases the number of riders.