End of Chapter Solutions

Principles of Macroeconomics Second Edition

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Solutions to Chapter 1 Text Problems

Questions for Review

1. If an instructor gave daily quizzes, most students would respond by reading the required readings more diligently and carefully. You would most likely read and study more than if there were no daily quizzes. This is an example of a negative incentive: Students are incentivized to study in order to avoid a negative consequence, in this case a bad grade.
2. Seniors often earn lower grades in the last semester before graduation because their incentives have changed. Before the last semester, most seniors are concerned about getting a job or perhaps getting into graduate school, both of which require high grades. Often, in the last semester of college, seniors have already been accepted into graduate programs or have already found a job. They no longer have the same incentives to maintain a high GPA. This means some seniors would prefer to spend less time studying and more time with their friends.

   Hints and Common Pitfalls: Another useful way to think about this is to consider marginal costs and benefits. In the last semester of college, the marginal benefit of studying decreases—yes, you may get a higher grade, but that higher grade won't matter much for after-college plans. When the marginal benefit of studying decreases, you might decide to forgo studying for a different activity instead.
3. There are many possible answers to this question, depending on your individual situation, but all correct answers will have the following in common: The opportunity cost of reading this textbook is what you gave up in order to spend time reading the textbook. It's what you would have done had you *not* decided to read this textbook.

   For example, suppose you took 30 minutes to read the first chapter and look through the questions. For some people, the opportunity cost of reading this chapter might be 30 extra minutes of sleep. For some, it's 30 minutes of socializing with friends. For others, the opportunity cost is the money they would have made working for 30 minutes instead.

   Hints and Common Pitfalls: The opportunity cost of something is just the cost of the next most highly valued option. It's not the cost of *all* other options. For example, in the case of spending 30 minutes reading a textbook, it would be incorrect to say that the opportunity cost is 30 minutes of sleep and 30 minutes of exercise. The opportunity cost is just the cost of the next-best option—either sleep or exercise.
4. This is not true. Trade creates value; both sides are better off as a result. Trade, unlike football, is not a zero-sum game.

   Consider the following example. You and your friend go trick-or-treating. Your friend loves Reese's cups but doesn't care for M&Ms. In contrast, you really love M&Ms and don't really care for Reese's cups. If you trade one of your Reese's cups for one of your friend's M&Ms packets, you are both better off. In fact, you wouldn't bother to make the trade if you weren't made better off. Trade is not like football; in trade, both sides win.

Study Problems

1. a. Because your tickets are worth more than you paid for them, you have a direct positive incentive to resell them.
   b. The "sales tax holiday" is a direct positive incentive to buy more clothes during the back-to-school period. An unintended consequence of this policy is that fewer purchases are likely to be made both before and after the tax holiday.
2. While specifics of the answer will vary, the average standard of living has gotten better over the past 25 years. This is in large part due to changes in technology. Technological shifts have made cars more efficient, computers cheaper, and information much easier to access (among other improvements). Today, most people in college own their own computer or laptop; this would have been unheard of 25 years ago.
3. Below are some examples. Your students' answers will almost surely be different; however, they should address the same core ideas.
   - Incentives matter: You decide to buy a $20 item from a web site only to discover that spending another $5 gets you free shipping. If shipping on the $20 item is greater than $5, you may find something else to buy for $5, even if it is something you may not use. In this way, the web site is incentivizing people to spend more in order to have free shipping.
   - Life is about trade-offs: What if you want to adopt kittens from an animal shelter? Having

kittens would be a source of utility, as you would enjoy cuddling and playing with them. However, this would also mean extra work in feeding them, paying for their food and vet bills, and finding someone to watch them if you go on vacation.

- Opportunity cost: Should you go on a cruise with friends instead of going on a service trip with Alternative Spring Break? By making the choice of going on the cruise, you give up your next best option, which is going on a service trip with Alternative Spring Break. This service trip was the opportunity cost of going on the cruise.
- Marginal thinking: After a large dinner, you may or may not have dessert. You can compare the marginal benefits of having a scoop of ice cream against the marginal cost. In this case, the marginal benefit is the enjoyment of delicious ice cream. The marginal cost is the extra fullness you would feel as a result of eating even more food and the extra calories that you have now consumed. If the marginal benefit outweighs the marginal cost, then you should indulge in dessert.
- Trade creates value: If you enjoy cooking but dislike doing dishes, and your roommate enjoys eating homemade meals but doesn't like cooking, you can trade: You can cook a homemade meal for the two of you, and your roommate can do the dishes. You are both better off: you can avoid doing dishes by cooking a little bit more food, and your roommate can enjoy a homemade meal in exchange for doing a few dishes.

4. If Colombia decided to specialize in the production of coffee, it could trade coffee to Canada in exchange for computer software. This process illustrates gains from specialization and trade. Both countries have a comparative advantage in producing one particular good. Colombia has ideal coffee-growing conditions, and Canada has a workforce that is more adept at writing software. Since both countries specialize in what they do best, they are able to produce more value than they could produce by trying to make both products on their own.
5. Depending on the opportunity cost of moving by yourself, hiring movers might actually be less costly. Suppose that it costs $200 to hire movers to help you move, and if you move by yourself, it would take you 8 hours. If the opportunity cost of those 8 hours is working a job that nets you $30/hour (so $240 over 8 hours), then it definitely makes sense to hire movers, and it would be rational to do so.

   Hints and Common Pitfalls: People often forget to think of opportunity cost when trying to figure out the best course of action. Remember to take into account what you would have done if you didn't move yourself. This is your opportunity cost.

   Another thing to think about: It might be rational to choose to hire movers even if your opportunity cost isn't working at a job. Suppose the opportunity cost of moving by yourself is spending time with friends that you won't be able to see for another year. In this case, if you think that 8 hours with friends is worth more than $200, it would be rational for you to hire movers.
6. The women have a direct positive incentive to wait in line. They will save $200 when they buy the TV. There are many trade-offs that they face: missed sleep, time they could have spent with family members and friends, and the time they could be working instead of waiting in line, to name just a few.

   It is hard to see the women's choice as rational when examining it using marginal analysis. They will save $200, but they will spend hundreds of hours in line. There is a high opportunity cost here and the hourly rate that they are using to value their time is very low. Saving $200 but spending 500 hours to save that money makes their time worth 40 cents an hour. They could work an extra job at minimum wage for 40 hours and earn enough money to purchase the TV at full price and still have over 400 hours free to do something else. In short, they don't seem to be aware of the opportunity cost of their time.
7. The answers will vary depending on your goals. For example, let's say you want to be one of the best surgeons in a town, or a stock trader/broker for a Wall Street firm, or an aspiring entrepreneur. To achieve your ambitious goal, you know you have to work hard, which requires that you sacrifice many different things you love to do.

   Upon completing your undergraduate program in finance, suppose you apply to many Wall Street companies and banks in your town. You get an offer (a decent one) with benefits. Let's say your ultimate goal is to become a financial advisor. Should you take this job and climb up the career ladder within this company? Or should you pursue an MBA program that pays you a higher salary and offers a better opportunity down the road? You must choose either one of these opportunities but not both, which means you have to sacrifice the other opportunity.

   You are in your advisor's office discussing what career path(s) you want to take upon graduation. More importantly, this discussion

determines what courses you should take for next semester. If you choose an entrepreneurship field, there is a certain sequence of courses you must complete by the time you graduate. On the other hand, if you choose an economics major, you must complete a different set of courses, which may or may not overlap. You must make a decision now before classes are quickly filled in. These courses are essential for your graduation in a timely manner. What would you do?

Another example: You have a part-time job in addition to being a full-time student. You love your job and working with the people around you, especially your boss (and his/her management style). It can be hard to find such a combination. Your boss begs you to work extra hours for the next two weeks when one of your coworkers has a family situation and can't come to work. But you have three midterm exams coming up, and you were planning to spend more time studying. If you work more hours, you know you're likely to perform poorly or even fail the course(s). If you can't work more hours, you are unlikely to get promoted or stay in the job, which is essential for your long-term goals. As you can see, there are always trade-offs to consider when working to achieve your goals.

8. a. In this example, Patrick is better off by $0.50 because he was willing to pay $2.50 but paid just $2.00. Jill is better off by $0.75 because she would have accepted $1.25 but Patrick paid her $2.00. So the total value created is the additional value to Patrick ($0.50) plus the additional value to Jill ($0.75), which sums to $1.25.
   b. The value added for Jason is $1,500, which is the difference between the minimum price he would have accepted ($6,000) and the price he received ($7,500). The value added for Hillary is $2,500, which is the difference between the maximum price she would have paid ($10,000) and the price she actually paid ($7,500). In total, $1,500 + $2,500 = $4,000 in new value was created through the exchange.

Solutions to Chapter 2 Text Problems

Questions for Review

1. A positive economic statement is one that can be tested and validated; a positive economic statement is based on fact and tells "what is." A normative economic statement cannot be tested or validated; a normative economic statement is often one of opinion and tells what "should be."

   An example of a positive economic statement: China's GDP grew at an average rate of 5% from 2000 to 2012.

   An example of a normative economic statement: Those who are unemployed should be given job training and assistance in finding a new job instead of unemployment insurance.

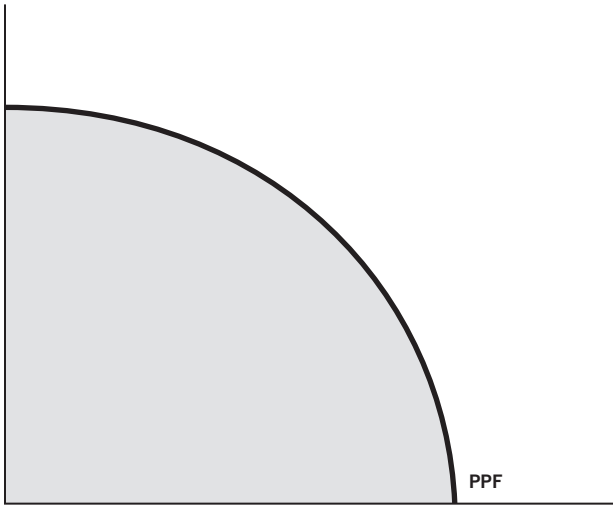
   Hints and Common Errors: It's easy to confuse the definitions of positive and normative. Here's one way to remember. When you think of "positive," think of scientific tests for diseases that either come back positive or negative. These are *tests*, and the absence or presence of a disease can be tested and validated; for example, "She tested *positive* for smallpox." When you think of "normative," think of the word "normal." Everyone has his or her own idea of what is normal and what is not—this is something that cannot be tested or validated and is a statement of what *should* be.

   Also, note that a positive statement need not be factually true as long as it can be tested. For example, consider the statement "All dogs have five legs." This is obviously not true, but it is still a positive statement. It can be tested and found false by finding just one dog that does not have five legs.

2. No. It is extremely difficult to build a model that is completely realistic. First, all relevant variables would have to be included—in many cases, this would make the model cumbersome and difficult to understand, which would decrease the model's usefulness. Second, even if all relevant variables were included, assumptions would have to be made about exactly how one variable affects the model; if any of these assumptions were incorrect, then the model would not make very good predictions.

   So, while it is important to think about how realistic a model is, it's also important to consider how adding variables might affect what kinds of assumptions need to be made, the simplicity of the model, and the model's predictive power.

3. There are different ways to draw production possibilities frontier curves. Yours should look something like the following:



   The efficient points are along the frontier. The inefficient points are inside of the frontier (the gray-shaded area). The possible points are the frontier and all points inside of it , and the infeasible points are the points outside the frontier (the white area).

4. The production possibilities curve bows outward from the origin because of the increasing opportunity cost of production. As you produce more of one good, it becomes harder and harder to produce an extra unit because you have already used the best resources for that unit.

   Almost any two goods should reflect this increasing opportunity cost. What is more important is your explanation—*why* do these two goods have increasing opportunity cost? Consider the following example of a society that produces only two goods: corn and diamonds. The first 20 diamonds that they produce come from land that is very suitable for producing diamonds. This land, because it is full of diamonds, is not very suitable for growing corn. Therefore, the opportunity cost of the first 20 diamonds is only five ears of corn. After this, in order to produce another 20 diamonds, you have to use land that is not quite as good at producing diamonds as the first parcel of land. This land is a bit more suitable for growing corn, so in order to produce the next 20 diamonds, you give up 15 ears of corn. As you produce more and more diamonds, you use land that is less and less suitable for diamonds and

more and more suitable for corn, so your opportunity cost of diamonds is increasing.

5. No, even if you have an absolute advantage in everything, you should not undertake everything on your own. What matters is your comparative advantage, and even if you have an absolute advantage in everything, other people will have a comparative advantage in some goods. The person with the comparative advantage in one good should produce that good. If each person (or country) produces the good in which he or she has the comparative advantage, then he or she can produce more in total than if the two workers each produced both goods. When people specialize, more can be produced, and this gain can be split. Everyone is better off.

   Hints and Common Errors: Remember that comparative advantage is a comparison word—it means that if one person has the comparative advantage in one good, then the other person, by definition, has the comparative advantage in the other good. It's similar to saying, "Kelly is taller than Alex" or "Kelly is better at being tall than Alex." Then, by definition, "Alex is shorter than Kelly" or "Alex is better at being short than Kelly." Comparative advantage works the same way. Suppose Kelly and Alex run a bakery that sells pies and cookies. If Kelly has the comparative advantage in baking pies, then this means that Alex has the comparative advantage in making cookies.

6. To determine which of two workers has a comparative advantage in a task, you look at each worker's opportunity cost. The worker with the *lower opportunity cost* is the one with the comparative advantage in that task. For example, suppose two workers can make either gift cards or hot dogs. The opportunity cost of one gift card is the number of hot dogs the worker could have made instead. Whoever gives up fewer hot dogs to make one gift card is the worker with the comparative advantage in gift cards. Intuitively, that worker is better at making gift cards because it costs her less (in units of hot dogs) to make each gift card. This means that the other worker would have the comparative advantage in making hot dogs.

7. To make a trade, all you need is for one worker (or country) to have a comparative advantage. Even if one of the workers has the absolute advantage in both goods, there can still be gains in trade if each worker has a comparative advantage. This is most easily seen using an example.

   Suppose Bert and Ernie can make chocolate chip cookies or lemonade, and the following table indicates the time it takes for each to complete these two tasks:

	One Batch of Chocolate Chip Cookies	One Glass of Lemonade
Bert	60 minutes	30 minutes
Ernie	45 minutes	15 minutes

   Ernie has the absolute advantage in both cookies and lemonade (he's faster at both), but Bert has the *comparative* advantage in cookies (Bert gives up only two glasses of lemonade compared to Ernie's three). Without trade, suppose Bert spends 30 minutes a day baking cookies and 90 minutes a day making lemonade, while Ernie spends 45 minutes a day baking cookies and 75 minutes a day making lemonade. This means that together they produce 1.5 batches of cookies and 8 glasses of lemonade. If they specialize and trade, they can produce 2 batches of cookies and 8 glasses of lemonade, which means they have created an extra one-half batch of cookies. There is value from trade here, even though one person has the absolute advantage in both goods!

8. The most important factor for economic growth is investment in capital goods. The more we spend today on capital goods, the more we can produce in the future. If we build more factories and machinery today, we're able to produce more products tomorrow. However, this comes at a cost—less consumption today. Other important factors are technology and changes in resources.

Study Problems

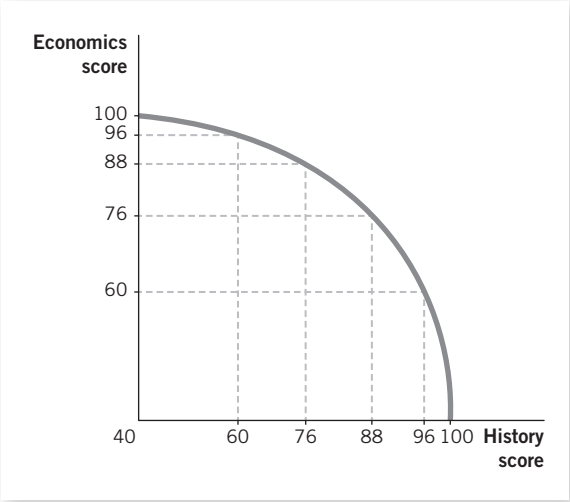
1. a. Michael's opportunity cost is 2 sculptures for each painting he produces. How do we know this? If he devotes all of his time to sculptures, he can produce 10. If he devotes all of his time to paintings, he can produce 5. The ratio 10:5 is the same as 2:1. Michael is therefore twice as fast at producing sculptures as he is at producing paintings. Angelo's opportunity cost is 3 sculptures for each painting he produces. If he devotes all of his time to sculptures, he can produce 6. If he devotes all of his time to paintings, he can produce 2. The ratio 6:2 is the same as 3:1.

   b. For this question, we need to compare Michael's and Angelo's relative strengths. Michael produces 2 sculptures for every painting, and Angelo produces 3 sculptures for every painting. Because Michael is only twice as good at producing sculptures, his opportunity

cost of producing each painting is 2 sculptures instead of 3. Therefore, Michael is the low-opportunity-cost producer of paintings.

c. If they specialize, Michael should paint and Angelo should sculpt. You might be tempted to argue that Michael should just work alone, but if Angelo does the sculptures, Michael can concentrate on the paintings. This is what comparative advantage is all about.

2. a.



b. Yes, because it is not a straight line.

c. The opportunity cost is that the student's grade falls from 96 to 76 in history.

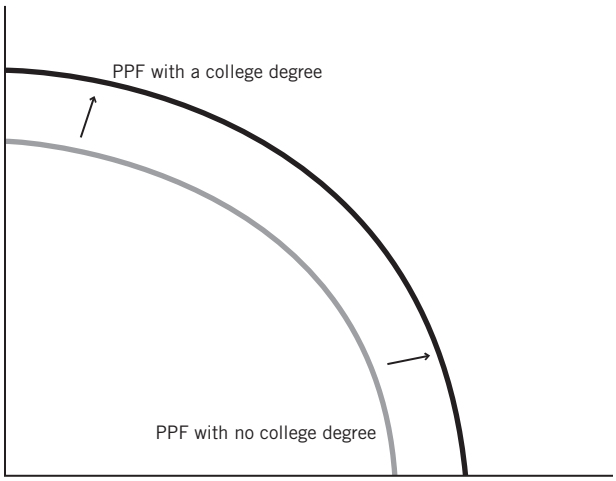
3. Your economics professor should probably not take time out of his or her teaching schedule in order to mow the lawn. Suppose your professor can produce either economics lessons or mowed lawns; his or her opportunity cost of mowing the lawn is the income that he or she gives up by mowing the lawn instead of teaching. If your professor hires his or her neighbor's 16-year-old son to mow the lawn instead, then they both gain from this trade. Your professor has a comparative advantage in producing quality economics lectures, so the professor should teach. The professor pays the neighbor's son to mow the lawn instead, and both are better off.

Hints and Common Errors: Another way to think about this question is to think about how much your professor values his or her time. Suppose the professor is paid for each hour that he or she teaches, and suppose that he or she can mow the lawn in an hour. If the amount that the professor is paid is greater than the amount it would cost to hire someone to mow the lawn, then it makes more sense for the professor to teach.

Of course, the question specifically refers to your professor taking time out of his or her teaching schedule to mow the lawn. It is possible that the value of his or her time varies according to the time of year. In the summer, when your professor does not teach, his or her value of time might be much lower, and he or she may choose to mow the lawn instead. This also applies to your own time. You might take a part-time job in the summer that pays $20/hour but not be willing to take that same job during the school year. You may value your time more during the school year because you need to study for your classes and raise your own human capital stock. Your opportunity cost of working might be higher during the school year than in the summer.

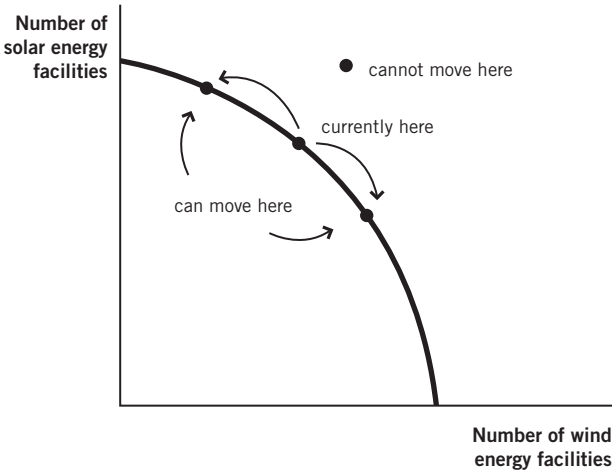
4. a. Positive
b. Positive
c. Normative
d. Normative
e. Normative

5. Your decision to invest in a college degree today adds to your capital stock. You are investing in your human capital so that you will be able to produce and earn more in the future. This shifts out your future PPF. With a college degree, you can get a job that allows you to earn and buy more.



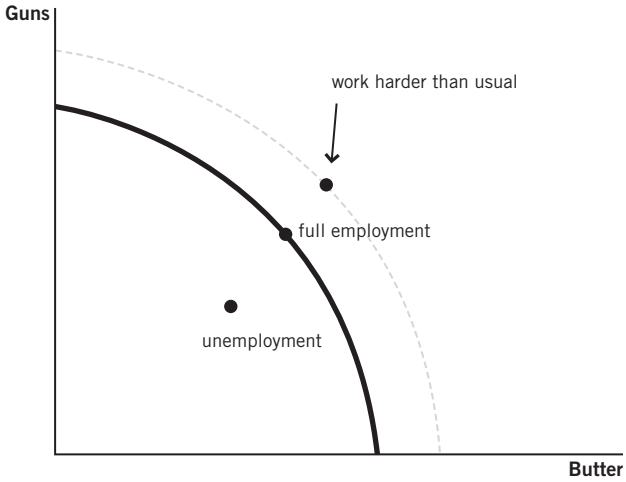
6. A new fertilizer that doubles potato production will shift the entire PPF out along the potato axis but not along the carrot axis. Nevertheless, the added ability to produce more potatoes means that less acreage will have to be planted in potatoes and more land can be used to produce carrots. This makes it possible to produce more potatoes and carrots at many points along the production possibilities frontier. Figure 2.3 has a nice illustration if you are unsure how this process works.

7. Assuming that resources are already being efficiently used in other programs (i.e., there is nowhere to take money from other programs without affecting the programs' success), and assuming that the politician cannot raise the funds from another source, it will be impossible to build additional facilities for the solar and wind power programs. You are already at the frontier of the PPF and utilizing all of your resources efficiently. You can move *along* the frontier and create either more wind power *or* more solar power but not both. To create more of both, you would have to be at a point outside of the PPF, which is infeasible.



8. a. Rachel gives up 2 pies for every loaf she makes. Joey gives up 1 pie for every loaf he makes.
   b. Rachel
   c. Joey
   d. Joey should make the bread and Rachel the pies.
   e. Rachel makes 2 pies per loaf and Joey makes 1 pie per loaf. So any trade between 2:1 and 1:1 would benefit them both.
9. Unemployment would be a point inside the frontier. There are resources (people) that are not being used efficiently. If jobs were provided to those who are unemployed, then it would be possible to increase production in one sector without having to give up production in another. For example, suppose the unemployed were hired to build a bullet train from Seattle to Los Angeles. The bullet train would be produced without having to give up production in the food or manufacturing sectors. Therefore, full employment would be a point on the frontier. At full employment, it would be impossible to gain more of one good without giving up another good (assuming no technological advances).

   If, in a time of crisis, people pitch in and work much harder than usual, then the production possibilities frontier shifts out. The economy is able to produce more of everything because everyone is working much harder. Note, however, that this shift may not be sustainable over time.



10. The following lines illustrate the opportunity costs and trade-offs in the poem.

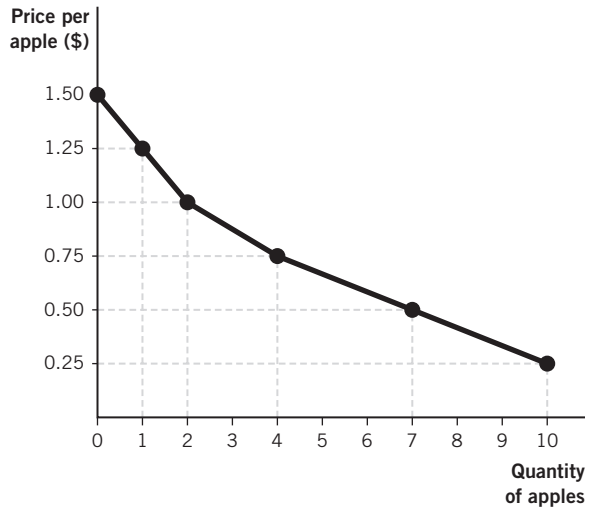
    Line 2: "And sorry I could not travel both
    Line 13: Oh, I kept the first for another day!
    Line 19: I took the one less traveled by,"

    To be clear, you could also include the following two lines.

    Line 4: "And looked down one as far as I could
    Line 6: Then took the other, as just as fair,"
11. Despite what you might think, the opportunity cost is *not* $200. You would be giving up $200 in enjoyment if you go to the Maroon 5 concert, but you would also have to pay $135 to see Taylor Swift, whereas the Maroon 5 ticket is free. The difference between the satisfaction you would have experienced at the Taylor Swift concert ($200) and the amount you must pay for the ticket ($135) is the marginal benefit you would receive from her concert. That amount is $200 − $135 = $65. You are not as big a Maroon 5 fan, but the ticket is free. As long as you think the Maroon 5 concert is worth more than $65, you will get a larger marginal benefit from seeing Maroon 5 perform than from seeing Taylor Swift perform. Therefore, the opportunity cost of using the free ticket is $65.

Appendix Study Problems

1. a. The following table plots the data provided in the table:



   b. The relationship between the price of apples and the quantity demanded of apples is negative. From the table, we can see that as the price of apples increases from $0.25 to $1.50, the quantity demanded of apples falls from 10 to 0. Graphically, you can see that the relationship is negative because the slope is negative and the line is downward sloping.

2. The slope is calculated by using the formula:

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{\$40 - \$20}{20 - 50} - \frac{\$20}{-30} = -0.6667$$

3. This sentence confuses correlation with causation. Here, there is a correlation. Ice cream sales increase; simultaneously, the number of people who drown also increases. However, this is not enough to prove causation—that the ice cream *caused* drowning. There are other explanations that also make sense. For example, it is possible that there is a third factor changing that causes both of these two events. In this case, it is more likely that hot weather causes both ice cream sales to increase and more people to swim—and, therefore, drown.

   Hints and Common Errors: One of the reasons economists build models is so they can see the change that occurs when *just one variable* changes. It's not enough to look at correlations; correlation doesn't prove causation, and causation is especially important when thinking about policies. Think about a policy that is based on the sentence in this question. If it is true that ice cream sales cause drowning, then a reasonable policy would be to ban the sale of ice cream. However, we all know that this would not actually cause fewer people to drown.