

CHAPTER ONE

LIMITS, ALTERNATIVES, AND CHOICES

CHAPTER OVERVIEW

This chapter begins with a discussion of the Ten Key Concepts to retain from the course and the meaning and importance of economics. In this first chapter, however, we will not plunge into problems and issues; instead we consider some important preliminaries. We first look at the economic perspective—how economists think about problems. Next, we examine the specific methods economists use to examine economic behaviour and the economy, including distinguishing between macroeconomics and microeconomics. We then look at the economic problem from both an individual and societal perspective. For the individual we develop the budget line, for society the production possibilities model. In our discussion of production possibilities, the concepts of opportunity costs and increasing opportunity costs, unemployment, growth, and present vs. future possibilities are all demonstrated. Finally, in the Last Word, some of the problems, limitations, and pitfalls that hinder sound economic reasoning are examined.

The Appendix to Chapter 1 provides an important introduction to graphical analysis. While this will be review material for most students, for some this may be new. Instructors are strongly urged to confirm that their students understand this section before proceeding. The software supplement can provide effective remedial help for those students who are not familiar with graphical analysis, or just need a refresher.

WHAT'S NEW

At the beginning of each chapter, the learning objectives have been modified to reflect tasks students should be able to complete.

The definition of investment has been clarified by specifying that it is spending on production or accumulation of capital goods.

When explaining the reason that money is not capital it is now specified that money is not only used to buy capital goods, but also to buy goods and services.

An example of capital has been added – ovens that are used to bake loaves of bread.

A more detailed explanation of entrepreneurs and their role in economic growth has been included.

There are now questions and problems at the end of each chapter where the questions are analytical and open-ended while the problems are focused on computations.

There are no longer questions that are designated as Key Questions.

Web based questions have been removed from each chapter and students are directed to the book's online learning center for questions that require information from the web.

References in graphs, tables, and study questions have been updated to reflect the most current data available.

INSTRUCTIONAL OBJECTIVES

After completing this chapter, students should be able to:

1. Define economics.
2. Describe the “economic way of thinking,” including definitions of purposeful behaviour, utility, marginal costs, marginal benefits and how these concepts may be used in decision-making.
3. Explain how economists use the scientific method to formulate economic principles.
4. Explain the importance of *ceteris paribus* in formulating economic principles.
5. Explain the steps used by policy makers.
6. Differentiate between micro- and macroeconomics.
7. Differentiate between positive and normative economics.
8. Explain the economizing problem from the individual’s perspective
9. Construct and explain a budget line.
10. Describe the economizing problem facing society.
11. Identify types of economic resources and types of income associated with various factors.
12. Construct a production possibilities curve when given appropriate data.
13. Illustrate economic growth, unemployment and underemployment of resources, and increasing costs using a production possibilities curve.
14. Give some real-world applications of the production possibilities concept.
15. Summarize the general relationship between investment and economic growth.
16. Explain and give examples of the fallacy of composition, post hoc fallacy, and other logical pitfalls. (Last Word)
17. Explain and illustrate a direct relationship between two variables, and define and identify a positive sloping curve. (Appendix)
18. Explain and illustrate an inverse relationship between two variables, and define and identify a negative slope. (Appendix)
19. Identify independent and dependent variables. (Appendix)
20. Define and identify terms and concepts listed at end of chapter and appendix.

COMMENTS AND TEACHING SUGGESTIONS

1. This chapter and related classroom activities will set the tone for the rest of the course. The methods used in the initial class meetings set the expectations and attitudes of the students. Making dramatic changes later can be confusing and the outcome less successful than desired. Please refer to the “Getting Started” section in the introduction for detailed suggestions. If you plan to make current events an integral part of the class, consider offering educational subscriptions to *The Globe and Mail*, or one of the weekly news or business publications such as *The Economist*.
2. On the level of personal decision-making, students might be asked to list all of the economic choices they had to make that day or that week. This impresses upon them that, as Alfred Marshall said in the 1890s, “economics is the study of man in the ordinary

business of life.” To illustrate the rational basis of their decisions, students could analyze one or two of these choices in terms of the alternatives they gave up. What other choices did they have? What criteria were used to judge the alternatives? A discussion of how rational our decisions are might also follow, providing an opportunity to introduce problems such as imperfect information and short v. long-term objectives.

3. There are many dimensions to the topic of “utility” that introductory students will benefit from contemplating. With these many dimensions comes the danger in taking students too deep too quickly. It is useful for students to understand that utility may be obtained both through material and nonmaterial means. Accordingly, it may be difficult to express how much one is willing to pay (or otherwise sacrifice) to obtain utility through a given activity.

When discussing rational behaviour, and seemingly irrational decisions, it may be useful to point out that for some people their utility is interdependent. You can have a bit of fun telling students that economists define love as “strongly interdependent utility functions.” The main point, of course, is that there are many situations where people obtain utility through seeing others having material and nonmaterial wants satisfied. Likewise, some gain utility from watching others suffer, even if it means that they are themselves worse off in material terms.

If a question arises about the measurement of utility, the distinction between cardinal and ordinal utility can be made, but there is little to be gained from an elaborate discussion. Students may find it interesting that Jeremy Bentham (whom they meet in Origins web-button 1.2) envisioned some sort of “util-o-meter,” a contraption that one might strap to the head to record brain waves in an attempt to measure utility from an activity. Even suggesting that one might use “utils” as a measure of satisfaction often amuses students and helps them better recall this topic.

4. As the text suggests, it may be useful to discuss several non-economic examples to illustrate the importance of models or simplification – for example, explaining that a road map is a model or simplification of the real world. The amount of detail on any road map would be determined by the needs of the traveler, i.e., “I need to travel between Winnipeg and Regina as quickly as possible,” versus, “I would like to visit some historical museums as I am traveling through Nova Scotia.” Neither road map would have the details of the real world. Devoting some time and effort to this point can help students see the importance of using economic models to represent the real world. You may wish to use the AAI piece below (previously on the web site).

Concept Illustration -- Abstractions and Models

"What do you consider the largest map that would be really useful?"

"About six inches to the mile."

"About six inches!" exclaimed Mein Herr. "We very soon got six yards to the mile. And then came the grandest idea of all! We actually made a map of the country on a scale of a mile to a mile!"

"Have you used it much?" I enquired.

"It has never been spread out yet," said Mein Herr. "The farmers objected. They said it would cover the whole country and shut out the sunlight!"

Lewis Carroll
Silvie and Bruno, 1889

In many ways, good economic models are like good maps. Both are abstractions that purposely leave out irrelevant facts and circumstances. Both are useful and practical *because* they simplify complex realities.

Maps not only help us understand geographical relationships but also serve as useful tools. A road map of Canada, for instance, helps us understand where Prince Edward Island is located relative to Manitoba. It also is highly practical in helping us drive between Saskatchewan and British Columbia.

In much the same way, economic models are helpful and useful. For example, a model indicating how consumers respond to a change in a product's price helps us understand a significant facet of human behaviour. That model also is highly practical; among other things, it identifies the primary way a business can reduce an overstock of unsold goods.

The appropriate map or appropriate economic model is the simplest one that accomplishes a specific goal. Although we may need a highly detailed street map of Montreal to find a specific residence there, we need only a general road map to drive between Montreal and Quebec City. Similarly, we need a highly complex, detailed economic model to predict the economic effects of a general reduction of Canadian tariffs (taxes on imported goods) on the relative outputs of various Canadian industries. In contrast, a much simpler model will suffice to show how a reduced Canadian tariff on imported beef will affect the total consumption of beef in Canada.

You will discover many economic models in your study of economics. The trick is to use the right model for the right purpose. Think of these models as highly useful, highly practical "maps," which help us better understand elements of the highly complex economy.

5. Most students are all too familiar with the problem of scarcity. Although income and time are not resources in the way in which we define resources in economics, these are what are most scarce to students. Explain how making a budget is dealing with the problem of their limited financial resources and their virtually unlimited wants. Other examples can be how businesses choose between two products when allocating their limited resources and choose between two resources when allocating their limited revenues. Further discussion can bring in examples of allocating federal and/or state tax revenues, especially when state revenues compete with funding the state university.
6. To personalize the problem of opportunity cost, ask what else they could be doing during a specific economics class; what are their foregone alternatives? Why might it be more expensive for older students to attend the class than younger ones? Encourage students to find examples of opportunity cost in newspaper articles and magazines. Choice is a necessary part of life; every action has its costs and benefits. Identifying and quantifying these tradeoffs is at the heart of economic analysis.

You may also want to use the following illustration to facilitate student understanding of opportunity cost.

Concept Illustration – Opportunity Cost

The concept of opportunity cost can be illustrated through the eyes of a small child. Suppose that a young girl named Amber receives a \$30 gift certificate from her grandparents to be used at Toys4Me. The grandparents take the girl to the store, where she spots several toys she would like—all priced above \$30. After gaining a sense of what is affordable, Amber narrows her focus to small stuffed animals (\$10 each) and picture books (\$5 each).

The grandparents tell Amber that she can buy three stuffed animals, six books, or some limited combinations of the two items. She initially settles on one stuffed animal at \$10 and four picture books at \$5 each. The grandparents assure her that this selection works; it will exactly use up the \$30 certificate. Amber takes the goods to the checkout counter.

But while waiting to pay, she changes her mind. She decides she wants another stuffed animal because they are so cute. What should she do? The grandparents tell her to go pick out a second stuffed animal and then return two of her four books to the shelf. She makes the exchange, ending up with two stuffed animals at \$10 each and two picture books at \$5 each.

From an adult's perspective, the second stuffed animal cost \$10. But in the eyes of the child, *it cost two picture books*. To get the second stuffed animal, Amber had to give up two books. That sacrifice was the *opportunity cost* of her last-minute decision. Amber's way of looking at cost is one of the fundamental ideas in economics.

7. Current news articles can serve many purposes in a principles class. Most instructors assign a high priority to helping students apply the general principles of economics to the specific problems and decisions they make. Short essays, oral reports, class discussion and longer-term projects are all examples of how current news could be incorporated into the course. A term project focused on current issues such as health care, welfare reform, environmental problems, defence spending, or education can help students develop an appreciation of the problem of scarcity and the trade-offs that need to be considered when formulating public policy.
8. The problems of underdeveloped countries could also be used to illustrate the seriousness of choosing between capital goods and consumer goods. Focusing a project on the problems of a single developing country can be interesting. It would allow students to make many comparisons including the impact of differing economic systems, degree of government regulation, environmental quality standards, differences in resource availability, climate, educational levels, and of course: the choice between consumer and capital goods.

STUDENT STUMBLING BLOCKS

1. Instructors cannot take for granted students' background knowledge of economics. Students generally have no idea about the magnitude of common economic measurements and, therefore, their reading of the news may be coloured by this lack of knowledge. One teaching tip that has worked for others is to give students a pretext during the first week of class, in which simple questions are asked about the Canadian economy. For example, questions can be asked about the size of population and labour force, unemployment and inflation rates, GDP, federal budget, deficits and debt. You will find wildly different answers to these questions with most far away from "ball park" figures. This exercise

accomplishes two things. First, it lets students know that they have a lot to learn about “everyday” news items. Second, the correct answers can give them some early perspective on news events as they relate to the course. As the course progresses, don’t forget to reinforce these facts by reminding students of them.

2. The specialized definitions in economics sometimes frustrate students, especially when they are familiar with a term in a different context. You may wish to use the following piece to help students appreciate that specialized definitions are common in our everyday lives.

Concept Illustration -- Specialized Definitions

"Then you should say what you mean," the March Hare went on.

"I do," Alice hastily replied; "at least I mean what I say—that's the same thing you know."

"Not the same thing a bit!" said the Hatter.

"Why, you might just as well say that 'I see what I eat' is the same thing as 'I eat what I see!'"

*Lewis Carroll,
Alice in Wonderland, 1865*

In an indirect way, the specialized terms used in games such as soccer, baseball, bowling, and so forth provide insights on the study of economics. Consider the game of pool, for example. The following terms are used in pool but have slightly or totally different meanings in everyday language: "pool," "cue," "kiss," "bank," "bridge," "combination," "break," "lag," "run," "rack," "scratch," "chalk," and "rail." Economics, too, uses terms that have different meanings than in everyday usage. In economics "labour" usually means all productive effort, not simply blue-collar workers; "capital" means human-made productive resources, not money used to buy resources. Also, "investment" means purchase of capital goods, not purchases of stocks and bonds; "public good" means goods that have special characteristics, not the good of society; and so forth.

Learning to communicate in the game of pool (or any other game) requires learning the meaning of specialized terms. It's the same with economics! It is not enough to "mean what you say," in economics. To communicate effectively (and to do well on exams!) you must "say what you mean," using the precise terms of the discipline.

3. Principles of economics students are often frustrated by the apparent lack of precision and definitive answers in the discipline. Economists establish a framework of rational decision-making based on maximizing utility, only to have that utility be immeasurable, or decision outcomes to be less than optimal because of imperfect information or seemingly irrational behaviour. It is important to help students understand that, among other things, they are gaining more of an analytical toolkit than a set of hard and fast rules or immutable natural laws. To help students appreciate this, it is useful to appeal back to the road map illustration. Using a road map, one can find the shortest (and presumably fastest) route

from one point to another. Even if someone has driven a route many times, there are factors such as traffic, weather, and road construction that may cause the otherwise quickest route to be less than ideal for that day's travel. Maps, like economic models, are often effective at telling people what they need to know. They are, however, limited in their effectiveness by factors beyond view.

4. In the discussion of marginal analysis, students often bring up examples that include "sunk" costs. For example, if you ask students why they came to class, many will answer that they paid tuition and imply that they would somehow lose that money if they didn't attend. If probed further, however, students will acknowledge that the college is unlikely to refund their money for any missed classes. That doesn't mean there wouldn't be future expenditures (paying tuition later to retake a failed class). It also doesn't mean that there aren't some psychological benefits to "getting what you paid for," but many students will erroneously identify that tuition payment as a marginal cost of attending a given day of class. While your intention may be to discuss sunk costs in a later chapter, student questions and discussion may require you to be prepared to introduce the concept earlier.
5. The concept of "full employment" is potentially problematic, particularly for those courses that will eventually cover macroeconomics. The use of the term in this chapter refers to the use of all available resources, human and non-human. In macroeconomics the concept is used to describe general conditions in labour markets and the economy as a whole, but is usually focused on the economy's use of its human resources. Even then it is recognized that under conditions of full employment there is unemployed labour. There is also the potential for confusion as the concept applies to the land resource. Fully employed deposits of coal or petroleum do not imply exhaustion of those resources. It is more a question of whether there is an adequate amount of these non-human resources available to sustain full employment in labour markets. A full discussion of this is probably not appropriate with students at this point, but you may find it useful to emphasize here that the concept is most often applied to the human resources. Then, when the topic arises again (for those covering macroeconomics), students will be less likely to feel that you are changing definitions on them.
6. The production possibilities curve simplifies many concepts for students who don't have "graph anxiety." However, for those who are uncomfortable with graphs, this model may confuse rather than simplify. Computerized tutorials will be especially helpful for these students.
7. The instructor could treat the appendix on graphical analysis as a supplement for those students who have weak backgrounds in reading or constructing simple graphs. There is often a wide disparity among student abilities here. Instructors may wish to have a remedial session and special assignments for students deficient in graphing skills. Comparing graphs to maps seems to help students who have "graph anxiety."

LECTURE NOTES

- I. **Learning objectives** – After reading this chapter, students should be able to:
 1. List the ten key concepts to retain for a lifetime
 2. Define economics and the features of the economic way of thinking.
 3. Describe the role of economic theory in economics.
 4. Distinguish between microeconomics and macroeconomics, and between positive economics and normative economics.
 5. List the categories of scarce resources and delineate the economic problem.

6. Apply production possibilities analysis, increasing opportunity costs, and economic growth.
7. Explain how economic growth and international trade increase consumption possibilities.

A1-1(Appendix) Understand graphs, curves, and slopes as they relate to economics

II. Definition of Economics

- A. The social science that studies how individuals, institutions, and society make optimal choices under conditions of scarcity.
- B. Human wants are unlimited, but the means to satisfy the wants are limited.

III. The Economic Perspective

- A. Scarcity and choice
 1. Resources can only be used for one purpose at a time.
 2. Scarcity requires that choices be made.
 3. The cost of any good, service, or activity is the value of what must be given up to obtain it. (opportunity cost).
- B. **CONSIDER THIS ... Free for All?**
 1. Products provided for “free” to an individual are not free for society because of the required use of scarce resources to produce them.
 2. Companies provide “free” goods as a marketing strategy to promote brand awareness.
 3. Products that are promoted as “free” to the individual may actually be bundled with another good for which the consumer must pay. Because a purchase is required to obtain them, these products are not really free to the buyer.
- C. Purposeful Behaviour
 1. Rational self-interest entails making decisions to achieve maximum utility.
 - a. Utility is the pleasure or satisfaction obtained from consuming a good or service.
 2. Different preferences and circumstances (including errors) lead to different choices.
 3. Rational self-interest is not the same as selfishness.
- D. Marginal Analysis: benefits and costs
 1. Most decisions concern a change in current conditions; therefore the economic perspective is largely focused on marginal analysis.
 2. Each option considered weighs the marginal benefit against the marginal cost.
 3. Whether the decision is personal or one made by business or government, the principle is the same.
 4. The marginal cost of an action should not exceed its marginal benefits.
 5. There is “no free lunch” and there can be “too much of a good thing.”
 6. Conflicts between long and short-run objectives may result in decisions that appear to be irrational, when in fact they are not.
- E. **CONSIDER THIS ... Fast Food Lines—An Economic Perspective**
 1. People choose the shortest line to reduce time cost.

2. Lines tend to have equal lengths as people shift from longer to shorter lines in effort to save time.
3. Lines are chosen based on length without much other information—cost of obtaining more information is not worth the benefit.
 - a. Imperfect information may lead to an unexpected wait.
 - b. Imperfect information may cause some people to leave when they see a long line.
4. When a customer reaches the counter, other economic decisions are made about what to order. From an economic perspective, these choices will be made after the consumer compares the costs and benefits of possible choices.

IV. Theories, Principles, and Models

- A. Economists use the scientific method to establish theories, laws, and principles.
 1. The scientific method consists of:
 - a. The observation of facts (real data).
 - b. The formulations of explanations of cause and effect relationships (hypotheses) based upon the facts.
 - c. The testing of the hypotheses.
 - d. The acceptance, rejection, or modification of the hypotheses.
 - e. The continued testing with an eye toward determination of a theory, law, principle, or model.
 2. Theories, principles, and models are “purposeful simplifications.”
 3. Principles are used to explain and/or predict the behaviour of individuals and institutions.
 4. Terminology—Principles, laws, theories, and models are all terms that refer to generalizations about economic behaviour. They are used synonymously in the text, with custom or convenience governing the choice in each particular case.
- B. Generalizations—Economic principles are expressed as the tendencies of the typical or average consumer, worker, or business firm.
- C. “Other things equal” or *ceteris paribus* assumption—In order to judge the effect one variable has upon another it is necessary to hold other contributing factors constant. Natural scientists can test with much greater precision than can economists. They have the advantage of controlled laboratory experiment. Economists must test their theories using the real world as their laboratory.
- D. Graphical Expression—Many economic relationships are quantitative, and are demonstrated efficiently with graphs. The “key graphs” are the most important.

V. Microeconomics and Macroeconomics

- A. Microeconomics looks at specific economic units.
 1. It is concerned with the individual industry, firm or household and the price of specific products and resources.
 2. It is an examination of trees, and not the forest.
- B. Macroeconomics examines the economy as a whole.

1. It includes measures of total output, total employment, total income, aggregate expenditures, and the general price level.
2. It is a general overview examining the forest, not the trees.

C. Positive and Normative Economics.

1. Positive economics describes the economy as it actually is, avoiding value judgments and attempting to establish scientific statements about economic behaviour.
2. Normative economics involves value judgments about what the economy should be like and the desirability of the policy options available.
3. Most disagreements among economists involve normative, value-based questions.

VI. Individual's Economic Problem

- A. Individuals are confronted with the need to make choices because their wants exceed their means to satisfy them.
- B. Limited income – everyone, even the most wealthy, has a finite amount of money to spend.
- C. Unlimited wants – people's wants are virtually unlimited.
 1. Wants include both necessities and luxuries (although many economists don't worry about this distinction).
 2. Wants change, especially as new products are introduced.
 3. Both goods and services satisfy wants.
 4. Even the wealthiest have wants that extend beyond their means (e.g. Bill Gates' charitable efforts).
- D. The combination of limited income and unlimited wants force us to choose those goods and services that will maximize our utility.
- E. Budget line
 1. Definition: A schedule or curve that shows the various combinations of two products a consumer can purchase with a specific money income.
 2. The model assumes two goods, but the analysis generalizes to all goods available to consumers.
 3. The location of a budget line depends on a consumer's money income, and the prices of the two products under analysis.
 4. The slope of the graphed budget line is the ratio of the price of the good measured on the horizontal axis (P_b in the text) to the price of the good measured on the vertical axis (P_{dvd}). A change in the price of one of the goods will change the slope of the budget line and change the purchasing power of the consumer.
 5. The budget line illustrates a number of important ideas:
 - a. Points on or inside the budget line represent points that are unattainable given the relevant income and prices. Points outside (up and to the right) the budget line are unattainable.
 - b. Tradeoffs and opportunity costs – the negative slope of the budget line represents that consumers must make tradeoffs in their consumption decisions; the value of the slope

measures precisely the opportunity cost of one more unit of a good under analysis.

- c. Limited income and positive prices force people to choose. Note that the budget line does not indicate what a consumer *will* choose, only what they *can* choose.
- d. Income changes will shift the budget line. Greater income will shift the line out and to the right, allowing consumers to purchase more of both goods. Increasing income lessens scarcity, but does not eliminate it.

VII. Society's Economic Problem

A. Scarce resources

1. Economic resources are limited relative to wants.
2. Economic resources are sometimes called *factors of production* and include all natural, human, and manufactured resources used to produce goods and services.

B. Resource categories:

1. Land or natural resources ("gifts of nature).
2. Labour or human resources, which include physical and mental abilities used in production.
3. Capital or investment goods, which are all manufactured aids to production like tools, equipment, factories, transportation, etc.
4. Entrepreneurial ability, a special kind of human resource that provides four important functions:
 - a. Combines resources needed for production.
 - b. Makes basic business policy decisions.
 - c. Is an innovator for new products, production techniques, and organizational forms.
 - d. Bears the risk of time, effort, and funds.

VIII. Production possibilities tables and curves are a device to illustrate and clarify society's economic problem.

A. Assumptions:

1. Economy is employing all available resources (Full employment).
2. Available supply of resources is fixed in quantity and quality at this point in time.
3. Technology is constant during analysis.
4. Economy produces only two types of products.
 - a. While any two goods or services could be used, the example in the chapter assumes that one product is a consumer good (pizza), the other a capital good (industrial robots).
 - b. Consumer goods *directly* satisfy wants; capital goods, which are used to produce consumer goods, *indirectly* satisfy wants.

B. Choices will be necessary because resources and technology are fixed. A production possibilities table illustrates some of the possible choices (see Table 1.1).

C. A production possibilities curve is a graphical representation of choices.

1. Points on the curve represent maximum possible combinations of robots and pizza given resources and technology.
2. Points inside the curve represent underemployment or unemployment.
3. Points outside the curve are unattainable at present.
- D. Optimal or best product-mix:
 1. It will be some point on the curve.
 2. The exact point depends on society; this is a normative decision.
- E. Law of increasing opportunity costs:
 1. The amount of other products that must be foregone to obtain more of any given product is called the opportunity cost.
 2. Opportunity costs are measured in real terms rather than money (market prices are not part of the production possibilities model.)
 3. The more of a product produced the greater is its (marginal) opportunity cost.
 4. The slope of the production possibilities curve becomes steeper, demonstrating increasing opportunity cost. This makes the curve appear bowed out, concave from the origin.
 5. Economic Rationale:
 - a. Economic resources are not completely adaptable to alternative uses.
 - b. To get increasing amounts of pizza, resources that are not particularly well suited for that purpose must be used. Workers that are accustomed to producing robots on an assembly line may not do well as kitchen help.
- F. Optimal allocation revisited:
 1. How does society decide its optimal point on the production possibilities curve?
 2. Recall that society receives marginal benefits from each additional product consumed, and as long as this marginal benefit is more than the additional cost of the product, it is advantageous to have the additional product.
 3. Conversely, if the additional (marginal) cost of obtaining an additional product is more than the additional benefit received, then it is not “worth” it to society to produce the extra unit.
 4. Figure 1.3 reminds us that marginal costs rise as more of a product is produced.
 5. Marginal benefits decline as society consumes more and more pizzas. In Figure 1.3 we can see that the optimal amount of pizza is 200,000 units, where marginal benefit just covers marginal cost.
 - a. Beyond that, the added benefits would be less than the added cost.
 - b. At less than 200,000, the added benefits will exceed the added costs, so it makes sense to produce more.
 6. Generalization: The optimal production of any item is where its marginal benefit is equal to its marginal cost. In our example, this must occur at 7,000 robots.

IX. Unemployment, Growth, and the Future

- A. Unemployment occurs when the economy is producing at less than full employment or inside the curve (point U in Figure 1.4).
- B. In a growing economy, the production possibilities curve shifts outward.
 1. When resource supplies expand in quantity or quality.

2. When technological advances are occurring.

C. Consider This ... Women, the Workforce, and Production Possibilities

1. There has been an increase in the number of women who are working. This has had the effect of shifting the production possibilities curve outward.
2. Whereas 40% of the women worked in 1965, 62% of the women are now working part time or full time.
3. There are a number of reasons for this change:
 - a. An increase in women's wage rates.
 - b. Greater access to jobs.
 - c. Changes in preferences and attitudes.

D. Present choices and future possibilities: Using resources to produce consumer goods and services represents a choice for present over future consumption. Using resources to invest in technological advance, education, and capital goods represents a choice for future over present goods. The decision as to how to allocate resources in the present will create more or less economic growth in the future.

E. A Qualification: International Trade

1. A nation can avoid the output limits of its domestic production possibilities through international specialization and trade.
2. Specialization and trade have the same effect as having more and better resources of improved technology.

X. LAST WORD: Pitfalls to Sound Reasoning

A. Biases—Preconceptions that are not based on facts.

B. Loaded terminology.

1. Terms that contain the prejudice and value judgments of others.
2. It is very difficult for a person to describe economic behaviour without letting their options about that behaviour creep into their discussion. The distinction between positive and normative statements is not always clearly apparent.
3. Often, however, there is a deliberate attempt to sway opinion by using loaded terminology. (greedy owners, obscene profits, exploited workers, mindless bureaucrats, costly regulations, creeping socialism)

C. Fallacy of Composition

1. Fallacy: What is true for one individual or part of a whole is necessarily true for a group of individuals or the whole.
2. Examples: Standing at a football game, large crops and farm prices, microeconomics v. macroeconomics (individual saving behaviour v. aggregate saving)

D. Causation Fallacies

1. Post hoc fallacy: When two events occur in time sequence, the first event is not necessarily the cause of the second event.
2. Correlation versus causation: Events may be related without a causal relationship.

- a. The positive relationship between education and income does not tell us which causes the increase in the other. (Which is the independent variable and which is the dependent variable?)
- b. It may be that the increase income that occurs with increased education is due to some other third factor that is not under direct consideration.

QUIZ

1. Economics is a social science concerned with:
 - A. The best use of scarce resources to achieve the maximum satisfaction of economic wants.
 - B. Increasing the level of productive resources so there is a minimum level of income.
 - C. Increasing the level of productive resources so there is maximum output in society.
 - D. The best use of scarce resources paid for at the minimum level of cost to consumers and businesses.

Answer: A

2. A person should consume more of something when its marginal:
 - A. benefit exceeds its marginal cost.
 - B. cost exceeds its marginal benefit.
 - C. cost equals its marginal benefit.
 - D. benefit is still positive.

Answer: A

3. The process of developing hypotheses, testing them against facts, and using the results to construct theories is called:
 - A. Opportunity cost calculation
 - B. Microeconomics
 - C. Marginal analysis
 - D. The scientific method

Answer: D

4. Which is an illustration of a microeconomic question?
 - A. What is the current national rate of unemployment?
 - B. Is the economy experiencing a decline in the rate of inflation?
 - C. Will a new type of television set increase the number of buyers?
 - D. Is the production of goods and services in the economy greater this year than last year?

Answer: C

5. A schedule or curve that shows the various combinations of two products a consumer can purchase with a specific amount of money income is:
 - A. A tradeoff

- B. A budget line
- C. A tangent point
- D. An optimal output

Answer: B

6. Which of the following is real capital?

- A. a pair of stockings
- B. a construction crane
- C. a savings account
- D. a share of IBM stock

Answer: B

7. A point inside a production possibilities curve best illustrates:

- A. unemployment.
- B. the efficient use of resources.
- C. the use of best-available technology.
- D. unlimited wants.

Answer: A

8. A normative statement is one that:

- A. is based on the law of averages.
- B. applies only to microeconomics.
- C. applies only to macroeconomics.
- D. is based on value judgments.

Answer: D

9. The problems of aggregate inflation and unemployment are:

- A. major topics of macroeconomics.
- B. not relevant to the U.S. economy.
- C. major topics of microeconomics.
- D. peculiar to command economies.

Answer: A

10. On a production possibilities curve, the single optimal or best combination of output for any society:

- A. Is at a point near the top of the curve
- B. Is at the precise midpoint of the curve
- C. Is at a point near the bottom of the curve
- D. Depends upon the preferences of society

Answer: D

QUESTIONS

1. What is an opportunity cost? How does the idea relate to the definition of economics? Which of the following decisions would entail the greater opportunity cost: Allocating a square block in the heart of Toronto for a surface parking lot or allocating a square block at the edge of a typical suburb for such a lot? Explain. **LO 1.2**

Answer: An opportunity cost is what was sacrificed to do or acquire something else. The condition of scarcity creates opportunity cost. If there was no scarcity, there would be no need to sacrifice one thing to acquire another.

The opportunity cost would be much higher in Toronto as the alternative uses for that square block are much more valuable than for a typical suburban city block.

2. Cite three examples of recent decisions that you made in which you (at least implicitly) weighed marginal cost and marginal benefit. **LO 1.2**

Answer: Student answers will vary, but may include the decision to come to class, to skip breakfast to get a few extra minutes of sleep, to attend college, or to make a purchase. Marginal benefits of attending class may include the acquisition of knowledge, participation in discussion, and better preparation for an upcoming examination. Marginal costs may include lost opportunities for sleep, meals, or studying for other classes. In evaluating the discussion of marginal benefits and marginal costs, be careful to watch for sunk costs offered as a rationale for marginal decisions.

3. What is meant by the term “utility” and how does the idea relate to purposeful behaviour? **LO 1.2**

Answer: “Utility” refers to the pleasure, happiness, or satisfaction gained from engaging in an activity (eating a meal, attending a ball game, etc.). It is an important component of purposeful behaviour because people will allocate their scarce time, energy, and money in an attempt to gain the most utility possible.

4. What are the key elements of the scientific method and how does this method relate to economic principles and laws? **LO 1.3**

Answer: The key elements include the gathering of data (observation), the formulation of possible explanations (hypothesis), testing the hypothesis, determining the validity of the hypothesis, and repeated testing of hypotheses that have appeared to be valid in prior tests.

The scientific method is the technique used by economists to determine economic laws or principles. These laws or principles are formulated to explain and/or predict behaviour of individuals or institutions.

5. Indicate whether each of the following statements applies to microeconomics or macroeconomics:

LO 1.4

- a. The unemployment rate in Canada was 7.4 percent in November 2011.
- b. A Canadian software firm discharged 15 workers last month and transferred the work to India.

- c. An unexpected freeze in central Florida reduced the citrus crop and caused the price of oranges to rise.
- d. Canadian output, adjusted for inflation, grew by 3.3 percent in 2010.
- e. Last week, Scotiabank lowered its interest rate on business loans by one-half of 1 percentage point.
- f. The consumer price index rose by 1.8 percent in 2010.

Answer:

Macroeconomics: (a), (d), and (f)

Microeconomics: (b), (c), and (e)

6. State (a) a positive economic statement of your choice, and then (b) a normative economic statement relating to your first statement. **LO 1.4**

Answer: Student answers will vary. Example: (a) The unemployment rate is 6.8 percent; (b) the unemployment rate is too high. In general we treat “what is” statements as positive, “what should be” as normative, but keep an eye out for statements like “at full employment an increase in the production of pizzas *should* come at the cost of less robots.” Some students may incorrectly identify the statement as normative because of the term “should.”

7. What are economic resources? What categories do economists use to classify them? Why are resources also called factors of production? Why are they called inputs? **LO 1.5**

Answer: Economic resources are the natural, human, and manufactured inputs used to produce goods and services. Economic resources fall into four main categories: labour, land (natural resources), real capital (machines, factories, buildings, etc.,) and entrepreneurs. Economic resources are also called *factors of production* because they are used to *produce* goods and services. They are called *inputs* because they go *in* to a production process (like ingredients go into a bowl to make a cake), with the resulting goods and services also being referred to as *output*.

8. Why is money not considered to be a capital resource in economics? Why is entrepreneurial ability considered a category of economic resource, distinct from labour? What are the major functions of the entrepreneur? **LO 1.5**

Answer: Money is not considered a capital resource because money is not productive – it provides access to resources but itself does not directly contribute to the production of goods and services. Additionally, the quantity of money in circulation does not determine an economy's productive capacity, while the amount of capital and other resources does. Doubling the amount of money in circulation does not change the economy's physical capacity to produce goods and services. Money is, however, referred to as a *financial resource* and *financial capital*, reflecting its ability to acquire real economic resources.

Entrepreneurial ability and labour are both human resources, but they perform different functions in the productive process. Entrepreneurial ability does not directly produce goods and services; it organizes the resources that do. Labour refers to the human inputs that directly engage in production.

Entrepreneurs are risk-takers: They coordinate the activities of the other three inputs, namely land, labour, and capital, for profit—or loss, which is why they are called risk-takers.

Entrepreneurs sometimes manage companies that they own, but a manager who is not an owner is not necessarily an entrepreneur but may be performing some of the entrepreneurial functions for the company. Entrepreneurs are also innovators, or perhaps inventors, and profits help to motivate such activities.

9. Specify and explain the typical shapes of marginal benefit and marginal cost curves. How are these curves used to determine the optimal allocation of resources to a particular product? If current output is such that marginal cost exceeds marginal benefit, should more or fewer resources be allocated to this product? Explain. **LO 1.6**

Answer: The marginal benefit curve is downward sloping, MB falls as more of a product is consumed because additional units of a good yield less satisfaction than previous units. The marginal cost curve is upward sloping, MC increases as more of a product is produced since additional units require the use of increasingly unsuitable resource. The optimal amount of a particular product occurs where MB equals MC. If MC exceeds MB, fewer resources should be allocated to this use. The resources are more valuable in some alternative use (as reflected in the higher MC) than in this use (as reflected in the lower MB).

10. Explain if and how each of the following events affects the location of a country's production possibilities curve: **LO 1.6**

- The quality of education increases.
- The number of unemployed workers increases.
- A new technique improves the efficiency of extracting iron from ore.
- A devastating earthquake destroys numerous production facilities.

Answer:

- Assuming better education translates into better work skills, then productivity should rise and this would shift the curve outward.
- Should not affect location of curve. Production moves inward, away from the curve.
- The curve should shift outward as more production is possible with existing resources.
- The curve should shift inward with the destruction of resources (capital).

11. Suppose that, on the basis of a nation's production possibilities curve, an economy must sacrifice 10,000 pizzas domestically to get the 1 additional industrial robot it desires but that it can get the robot from another country in exchange for 9000 pizzas. Relate this information to the following statement:

"Through international specialization and trade, a nation can reduce its opportunity cost of obtaining goods and thus 'move outside its production possibilities curve.'" **LO 1.7**

Answer: The message of the production possibilities curve is that an individual nation is limited to the combinations of output indicated by its production possibilities curve. International specialization means directing domestic resources to output which a nation is highly efficient at producing. International trade involves the exchange of these goods for goods produced abroad. Specialization and trade have the same effect as having more and better resources or discovering improved production techniques. The output gains from greater international specialization and trade are the equivalent of economic growth.

LAST WORD Studies indicate that married men on average earn more income than unmarried men of the same age and education level. Why must we be cautious in concluding that marriage is the cause and higher income is the effect?

Answer: Correlation does not necessarily mean that there is causation. The relationship could be perfectly coincidental or dependent on some other factor not included in the analysis. It is also possible that higher income is the variable that "causes" marriage.

PROBLEMS

1. Potatoes cost Janice \$1.00 per kilogram and she has \$5.00 that she could possibly spend on potatoes or other items. If she feels that the first kilogram of potatoes is worth \$1.50, the second kilogram is worth \$1.14, the third kilogram is worth \$1.05, and all subsequent kilograms are worth \$0.30, how many kilograms of potatoes will she purchase? What if she only had \$2.00 to spend? **LO 1.2**

Answer: 3,2

Feedback: Janice will purchase potatoes until the value of potatoes is less than the cost of potatoes or until her income has been exhausted. For example, assume Janice has \$5.00 to spend on potatoes or other items and the cost of a kilogram of potatoes is \$1. Now assume the first kilogram of potatoes is worth \$1.50 to Janice. She will purchase this kilogram of potatoes since the value of the kilogram of potatoes (\$1.50) is greater than the cost (\$1). If the second kilogram is worth \$1.14 and the third kilogram is worth a \$1.05 then Janice will purchase these as well since the value exceeds the cost of \$1. If all remaining kilograms are worth \$0.30 then Janice will not purchase these because the value is less than the cost. So, Janice will purchase 3 kilograms of potatoes at total cost of \$3.00.

Now assume Janice only has \$2.00 to spend on potatoes. She will purchase the first kilogram because it is worth \$1.50 to her and it only costs a \$1. She will purchase the second kilogram because it is worth \$1.14. She has now spent her entire income on potatoes. She would like to purchase the third kilogram because the value of this kilogram of potatoes is \$1.05, but she does not have the income to make this purchase. So, Janice will purchase 2 kilograms of potatoes at a total cost of \$2.00.

2. Pham can work as many or as few hours as she wants at the university bookstore for \$9 per hour. But due to her hectic schedule, she has just 15 hours per week that she can spend working at either the bookstore or at other potential jobs. One potential job, at a café, will pay her \$12 per hour for up to 6 hours per week. She has another job offer at a garage that will pay her \$10 an hour for up to 5 hours per week. And she has a potential job at a daycare center that will pay her \$8.50 per hour for as many hours as she can work. If her goal is to maximize the amount of money she can make each week, how many hours will she work at the bookstore? **LO 1.5**

Answer: 4.

Feedback: Pham will choose to work at the bookstore as long as the wage rate at the bookstore exceeds her other opportunities. However, if another job offers a higher wage rate she will choose employment there. She will work until her total time allotment (for work) is exhausted. For example, assume Pham only has 15 hours per week that she can work and the wage rate at the bookstore is \$9 per hour. She can also spend her time working at a café that will pay her \$12 per hour for up to 6 hours per week, at a garage that will pay her \$10 an hour for up to 5 hours per week, and at a daycare center that will pay her \$8.50 per hour for as many hours as she can work. She will choose to work at the café for the full 6 hours because the wage rate at the café is \$12 per hour, which is greater than the wage rate at the bookstore of \$9. This leaves her with 9 hours of work time remaining. Next, she will choose to work at the garage for the full 5 hours because the wage rate here is \$10, which again is greater than the bookstore wage rate \$9. After this decision she only has 4 hours of work time remaining. She will choose to work these last 4 hours at the bookstore because the bookstore wage rate of \$9 exceeds the daycare center wage rate of \$8.50.

3. Suppose you won \$15 on a Lotto Canada ticket at the local 7-Eleven and decided to spend all the winnings on candy bars and bags of peanuts. The price of candy bars is \$0.75 and the price of peanuts is \$1.50. **LO 1.5**

- Construct a table showing the alternative combinations of the two products that are available.
- Plot the data in your table as a budget line in a graph. What is the slope of the budget line? What is the opportunity cost of one more candy bar? Of one more bag of peanuts? Do these opportunity costs rise, fall, or remain constant as each additional unit of the product is purchased?
- Does the budget line tell you which of the available combinations of candy bars and bags of peanuts to buy?
- Suppose that you had won \$30 on your ticket, not \$15. Show the \$30 budget line in your diagram. Has the number of available combinations increased or decreased?

Answers:

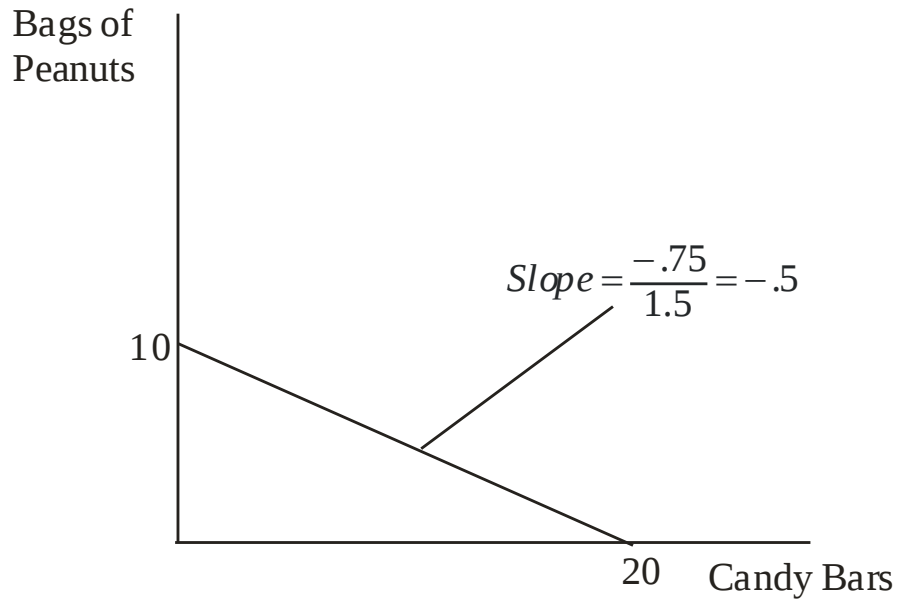
Part a:

Alternatives

Consumption

Goods	A	B	C	D	E	F
Candy bars	0	4	8	12	16	20
Bags of peanuts	10	8	6	4	2	0

Part b:



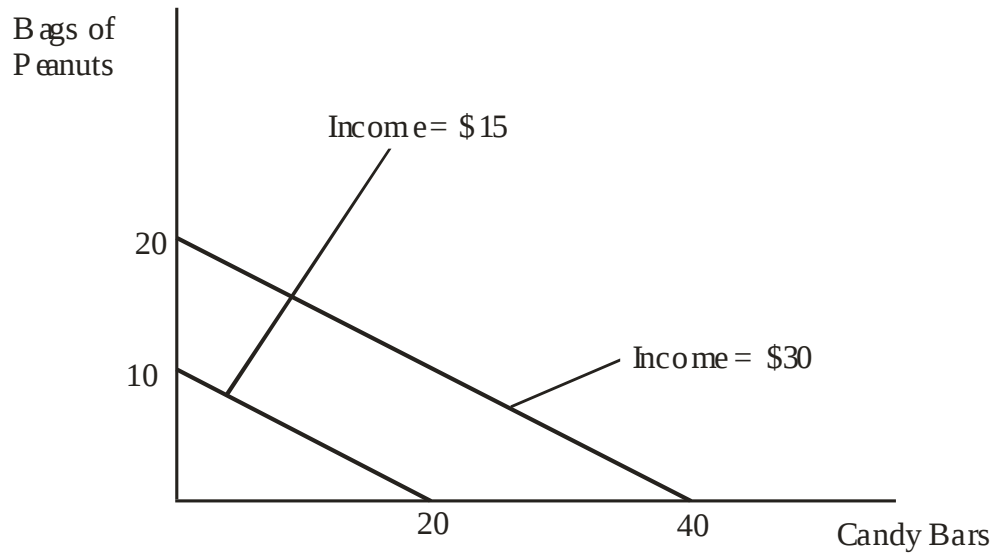
Feedback: The slope of the graphed budget line measures the ratio of the price of candy bars (P_{cb}) to the price of bags of peanuts (P_{bp}); more precisely, the slope is $P_{cb}/P_{bp} = \$-0.75/\$1.5 = -\frac{1}{2}$. Hence, the slope for the budget line above, with candy bars on the horizontal axis, is -0.5 ($= -P_{cb}/P_{bp}$). Note that the figure could also be drawn with bags of peanuts on the horizontal axis. The slope of that budget line would be -2.

The opportunity cost of one more candy bar is $\frac{1}{2}$ of a bag of peanuts. The opportunity cost of one more bag of peanuts is 2 candy bars. These opportunity costs are constant. They can be found by comparing any two of the consumption alternatives for the two goods.

Part c: No; it only tells you what is possible.

Feedback: The budget line does not tell you which of the available combinations of candy bars and bags of peanuts to buy. You will need to use your preference relationship for candy bars and bags of peanuts to determine which combination to buy. The budget line only tells you which combinations are feasible.

Part d: Increased.



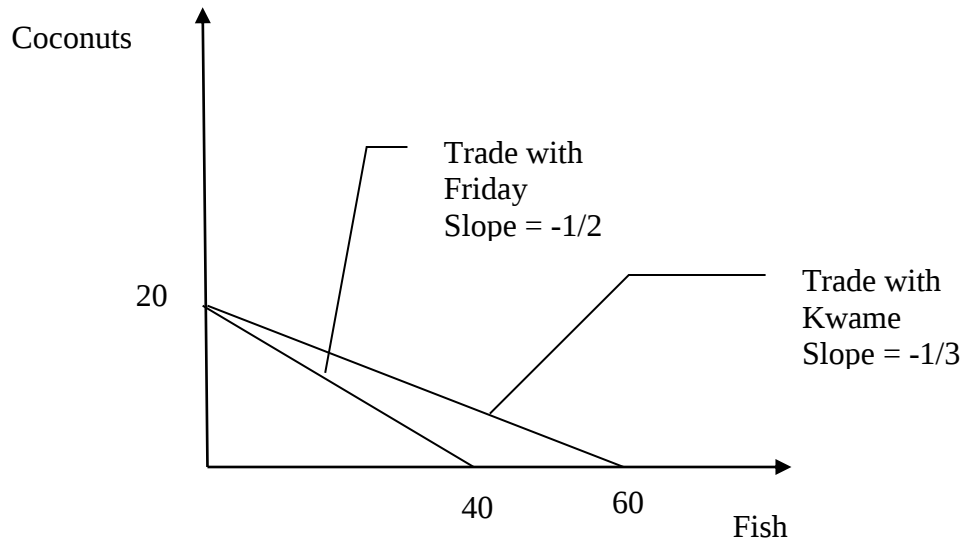
Feedback: The budget line at \$30 would be preferable because it would allow greater consumption of both goods.

4. Suppose that you are on a desert island and possess exactly 20 coconuts. Your neighbor, Friday, is a fisherman, and he is willing to trade 2 fish for every 1 coconut that you are willing to give him. Another neighbour, Kwame, is also a fisherman, and he is willing to trade 3 fish for every 1 coconut. **LO 1.5**

- On a single figure, draw budget lines for trading with Friday and for trading with Kwame. (Put coconuts on the vertical axis.)
- What is the slope of the budget line from trading with Friday?
- What is the slope of the budget line from trading with Kwame?
- Which budget line features a larger set of attainable combinations of coconuts and fish?
- If you are going to trade coconuts for fish, would you rather trade with Friday or Kwame?

Answers:

Part a: < Connect editor, make sure that both lines can be placed on a single figure and that coconuts are on the vertical axis >



Part b: $-1/2$

Feedback: The slope of the budget line from trading with Friday equals $-(1/2)$. This implies that for every coconut I give up, Friday must give up two fish. Or, for every fish that Friday gives up, I must give up $(1/2)$ a coconut.

Part c: $-1/3$

Feedback: The slope of the budget line from trading with Kwame equals $-(1/3)$. This implies that for every coconut I give up, Kwame must give up three fish. Or, for every fish that Friday gives up, I must give up $(1/3)$ a coconut.

Part d: The budget line from trading with Kwame

Feedback: The budget line from trading with Kwame features a larger set of attainable combinations of coconuts and fish. Because Kwame is willing to give up more fish per coconut, I can consume more of both (assuming I make a trade). This implies that you would prefer to trade with Kwame.

Part e: Kwame

Feedback: Because Kwame is willing to give up more fish per coconut, I can consume more of both (assuming I make a trade). This implies that you would prefer to trade with Kwame.

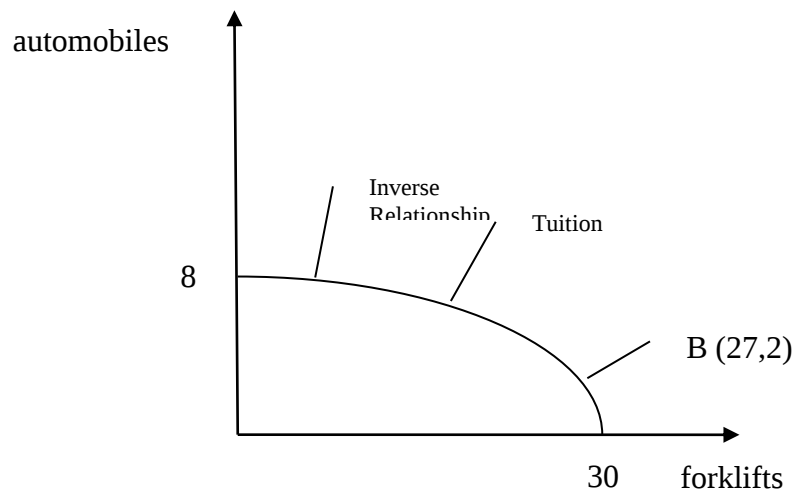
5. Below is a production possibilities table for consumer goods (automobiles) and capital goods (forklifts): **LO 1.6**

- Show these data graphically. Upon what specific assumptions is this production possibilities curve based?
- If the economy is at point C, what is the cost of one more automobile? Of one more forklift? Which characteristic of the production possibilities curve reflects the law of increasing opportunity costs: its shape or its length?
- If the economy characterized by this production possibilities table and curve were producing 3 automobiles and 20 forklifts, what could you conclude about its use of its available resources?
- Is production at a point outside the production possibilities curve currently possible? Could a future advance in technology allow production beyond the current production possibilities curve? Could international trade allow a country to consume beyond its current production possibilities curve?

Type of Production	Production Alternatives				
	A	B	C	D	E
Automobiles	0	2	4	6	8
Forklifts	30	27	21	12	0

Answers:

Part a: (See figure below.) The assumptions are full employment, fixed supplies of resources, fixed technology and two goods: consumer goods (automobiles) and capital goods (forklifts).



Part b: 4 automobiles and 21 forklifts; its shape.

Feedback: Consider the following example:

Type of Production	Production Alternatives				
	A	B	C	D	E
Automobiles	0	2	4	6	8
Forklifts	30	27	21	12	0

Assume the economy is producing at point C. Thus, the economy is producing 4 automobiles and 21 forklifts.

The cost of producing one more automobile can be found by moving to point D and calculating the number of forklifts given up for the 2 additional automobiles. At point D the economy is producing 12 forklifts, which is a loss of 9 forklifts (moving from C to D) for the 2 additional automobiles. Thus the cost of 1 more automobile equals 9 (forklifts) divided by 2 (automobiles), or $(9/2) = 4.5$ forklifts.

The cost of producing one more forklift can be found in an equivalent fashion. First, we will move to point B (from point C). Here we must give up 2 automobiles to get 6 forklifts. Thus, the cost of 1 more forklift equals 2 (automobiles) divided by 6 (forklifts), which is $(2/6) = (1/3)$.

In review, take the cost (loss) and divide by the gain. If we were at point D, the cost of one more forklift equals 2 automobiles (loss) divided by 9 forklifts (gain). Thus, the cost of 1 more forklift at point B is $(2/9)$ automobiles.

Increasing opportunity cost implies that we must give up more of a particular good to get an additional unit of a different good. This implies as we move along the production possibilities curve (from left to right) I must give up more automobiles to get an additional forklift. Thus, the SHAPE of the schedule captures the increasing opportunity cost concept.

Part c: Underutilizing.

Feedback: The economy is underutilizing resources (inside the PPC).

Part d: No; Yes; Yes.

Feedback: No, the country cannot produce outside its PPC. Yes, a technological advance would shift the PPC outward allowing the country produce more with a given amount of inputs. Yes, by specializing in goods we have a comparative advantage producing we can trade to gain access to goods beyond our own PPC.

6. Look at Figure 1.3. Suppose that the cost of cheese falls, so that the marginal cost of producing pizza decreases. Will the MC curve shift up or down? Will the optimal amount of pizza increase or decrease? **LO 1.6**

Answers: MC will shift down; the optimal amount of pizza will increase.

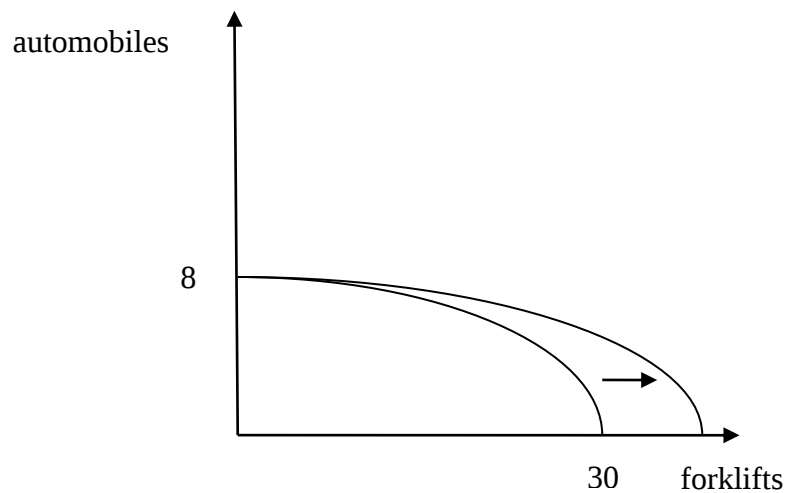
Feedback: To think about cost schedules we must think about input costs. If the cost of cheese falls, then the cost of making pizza is cheaper for all pizzas. This implies that the marginal cost schedule will shift down reflecting the lower input cost. For a given demand schedule, the optimal amount pizza produced and sold will increase and the equilibrium price would fall. The opposite story would apply if the cost of cheese were to increase.

7. Referring to the table in problem 5, suppose improvement occurs in the technology of producing forklifts but not in the technology of producing automobiles. Draw the new production possibilities curve. Now assume that a technological advance occurs in producing automobiles but not in producing forklifts. Draw the new production possibilities curve. Now draw a production possibilities curve that reflects technological improvement in the production of both goods. **LO 1.7**

Answers: See figures.

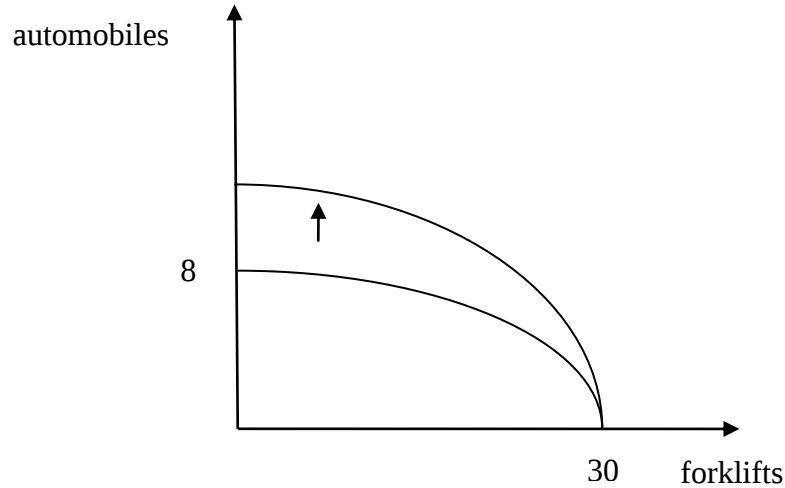
Technological advance in producing forklifts and not automobiles.

Feedback: This implies we can produce more forklifts with the given resources, so the schedule will shift out along the horizontal axis.



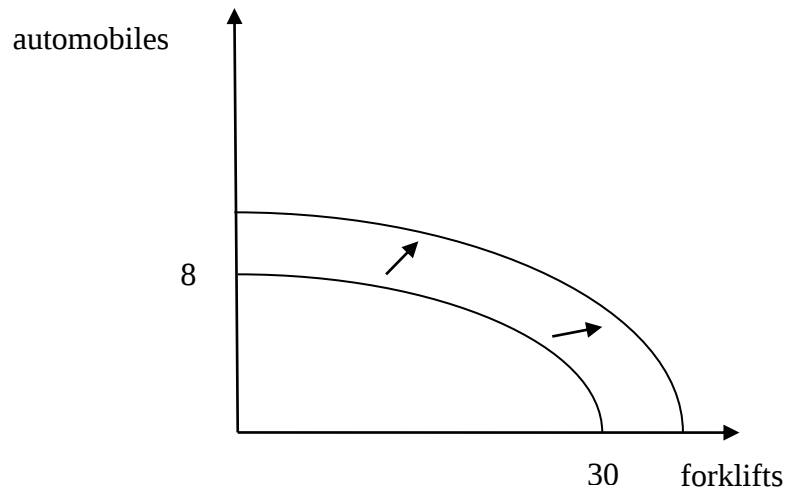
Technological advance in producing automobiles and not forklifts.

Feedback: This implies we can produce more automobiles with the given resources, so the schedule will shift up along the vertical axis.



Technological advance in producing automobiles and forklifts.

Feedback: This implies we can produce more forklifts and automobiles with the given resources, so the schedule will shift up out along the vertical and horizontal axes.



8. On average, households in China save 40 percent of their annual income each year, whereas households in Canada save less than 5 percent. Production possibilities are growing at roughly 9

percent annually in China and 3.5 percent in Canada. Use graphical analysis of “present goods” versus “future goods” to explain the differences in growth rates. **LO 1.7**

Answers: See figures below

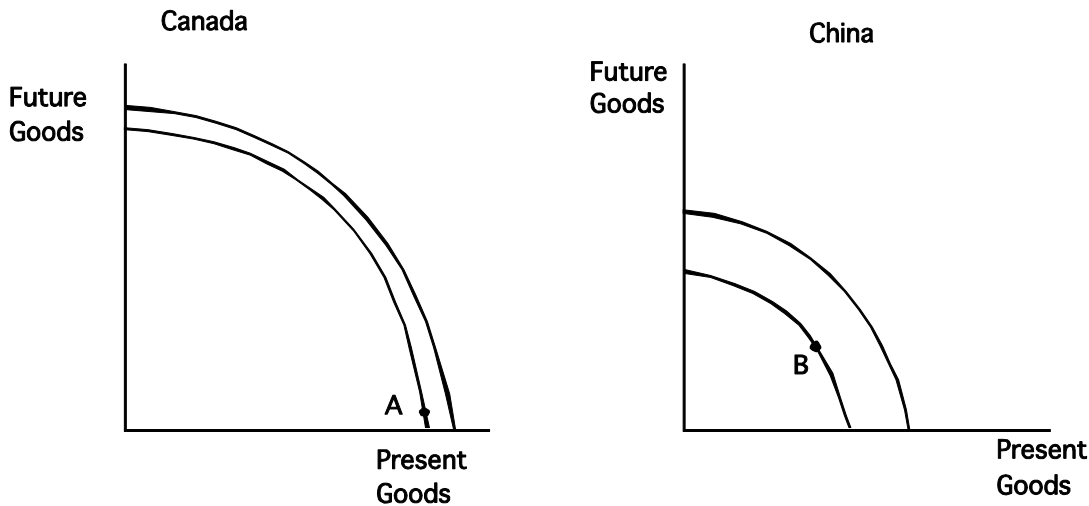


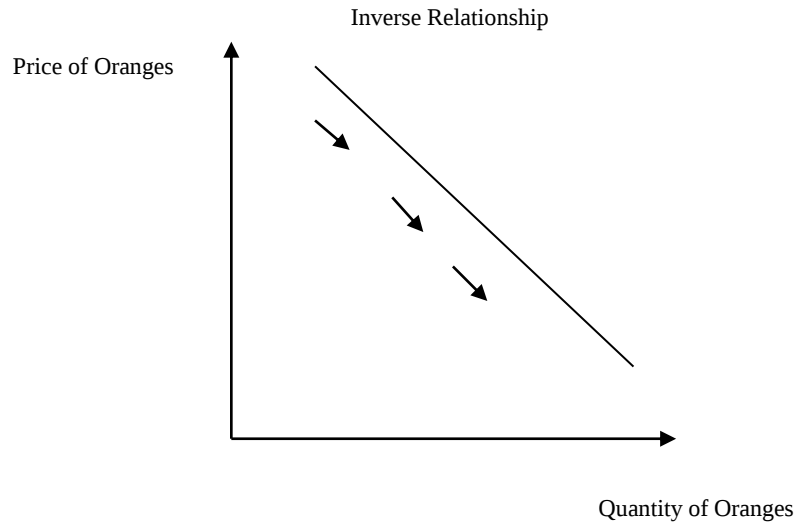
Figure 1

Feedback: Since Canada is consuming more today rather than saving, their production possibilities curve will shift out slower (less) over time because they are accumulating less capital. China's production possibilities curve will shift out faster (more) over time because they are accumulating more capital.

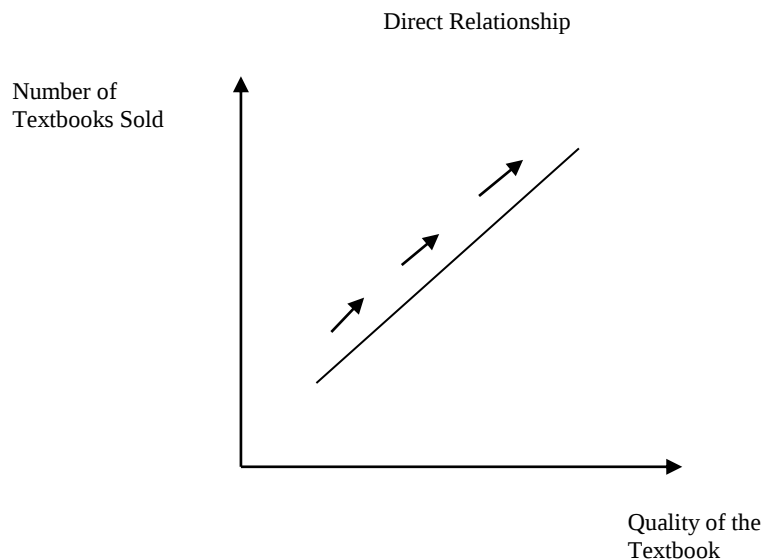
Appendix Questions

1. Briefly explain the use of graphs as means of representing economic relationships. What is an inverse relationship? How does it graph? What is a direct relationship? How does it graph? **LO A1.1**

Answer: Graphs help us visualize relationships between key economic variables in the data. For example, the relationship between the price of oranges and the number of oranges purchased is likely to be an inverse relationship. An inverse relationship is one where we observe one variable increasing and the other variable decreasing as a result (moving in opposite directions). Thus, as the prices of oranges increase we would expect to see a decrease in the quantity of oranges purchased. Graphically, we represent this inverse relationship as follows.



As another example, the relationship between the quality of a textbook and the number of textbooks sold is likely to be a direct relationship. A direct relationship is one where we observe one variable increasing and the other variable increasing as a result (moving in the same direction). Thus, as the quality of the textbook increases the number of books sold also increases. Graphically, we represent this direct relationship as follows.



2. Describe the graphical relationship between ticket prices and the number of people choosing to visit amusement parks. Is that relationship consistent with the fact that, historically, park attendance and ticket prices have both risen? Explain. **LO A1-1**

Answer: There is likely an inverse relationship between ticket prices and the number of people visiting amusement parks. As ticket prices increase relative to other goods, people will spend their income on these other goods. For example, they may decide to go to the movies instead of visiting the now more expensive amusement park.

The fact that, historically, park attendance and ticket prices have both risen over time does not change our story. This relationship is most likely the result of a change in demand, not a change in quantity demanded. The demand schedule for amusement parks has probably shifted to the right (an increase in demand) over time leading to an increase in attendance and prices.

3. Look back at Figure A1-2, which shows the inverse relationship between ticket prices and game attendance at Informed University. (a) Interpret the meaning of both the slope and the intercept. (b) If the slope of the line were steeper, what would that say about the amount by which ticket sales respond to increases in ticket prices? (c) If the slope of the line stayed the same but the intercept increased, what could you say about the amount by which ticket sales respond to increases in ticket prices? **LO A1-1**

Answer:

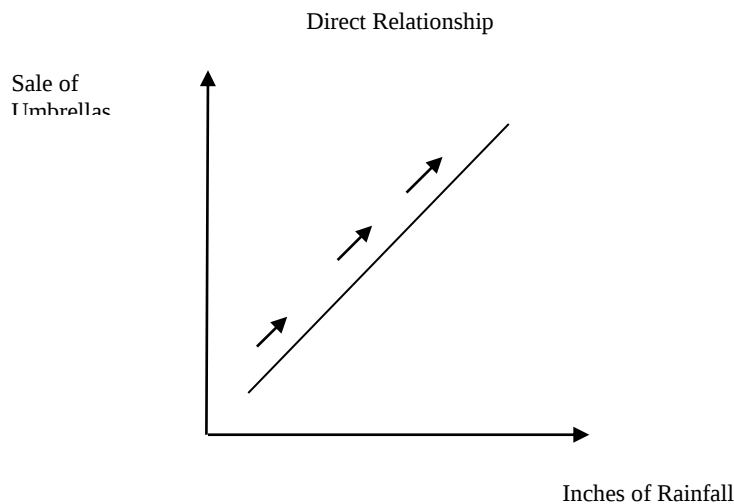
Part a: The slope of this relationship tells us how much the price of a ticket must fall to induce someone to buy an additional ticket. In this case, the slope of -2.5 tells us that the price must fall by \$2.50 to sell one more ticket (or to induce someone to buy one more ticket). The vertical intercept tells us the price at which no tickets will be sold. Here, this price is \$50. Combining these two components tells us that if the initial price is \$50 per ticket and the price falls to \$40, then 4 tickets will be purchased (one for each reduction in price of \$2.50, which is the slope).

Part b: If the slope of this line were steeper this would imply that the price must fall by more than \$2.50 to sell one more ticket. Or, thinking about this in the other direction, a steeper line would result in a smaller decrease in tickets purchased for a given increase in price. In other words, ticket sales (purchases) are less responsive to price movements.

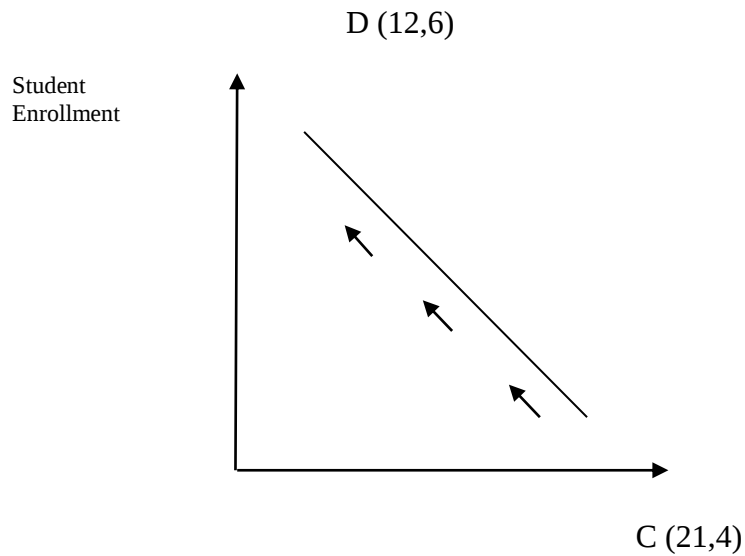
Part c: If the vertical intercept increased this would imply that individuals are willing to purchase more tickets at every price. This will be an increase in the demand for tickets. This will not affect the slope or the quantity response to a change in the price of tickets. We still have the relationship that the price must fall by \$2.50 to sell one more ticket (or to induce someone to buy one more ticket).

Appendix Problems

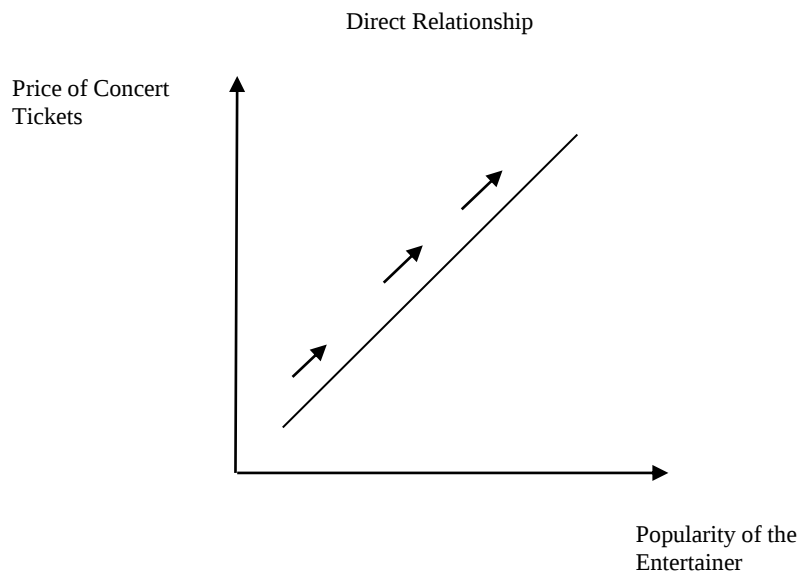
1. Graph and label as either direct or indirect the relationships you would expect to find between the following: (a) the number of centimeters of rainfall per month and the sale of umbrellas, (b) the amount of tuition and the level of enrollment at a college or university, (c) the popularity of a music artist and the price of her concert tickets. **LO A1-1**

Answer:**Part a:**

Part b:

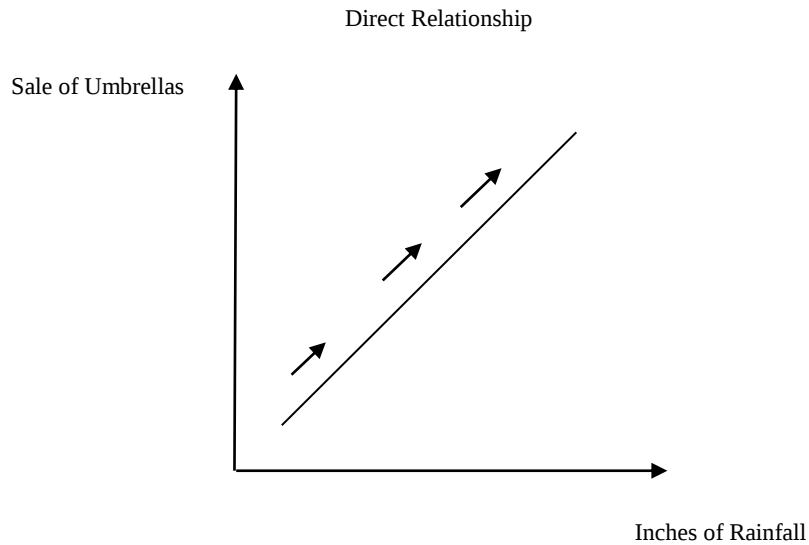


Part c:

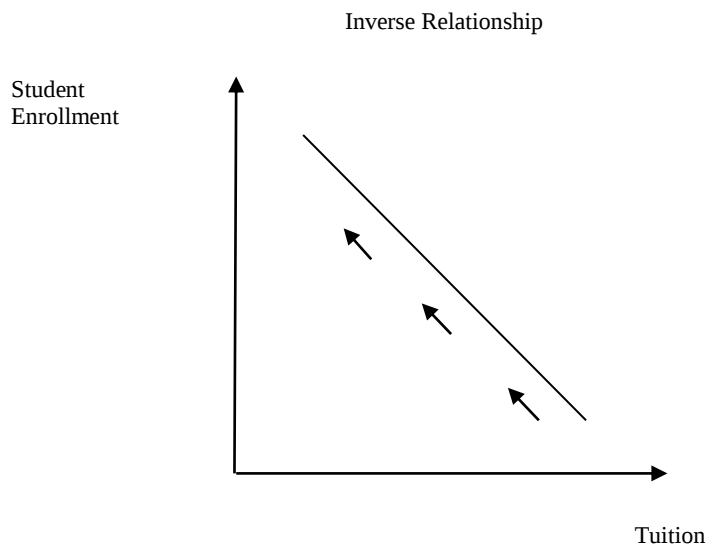


Feedback: Consider the following situations:

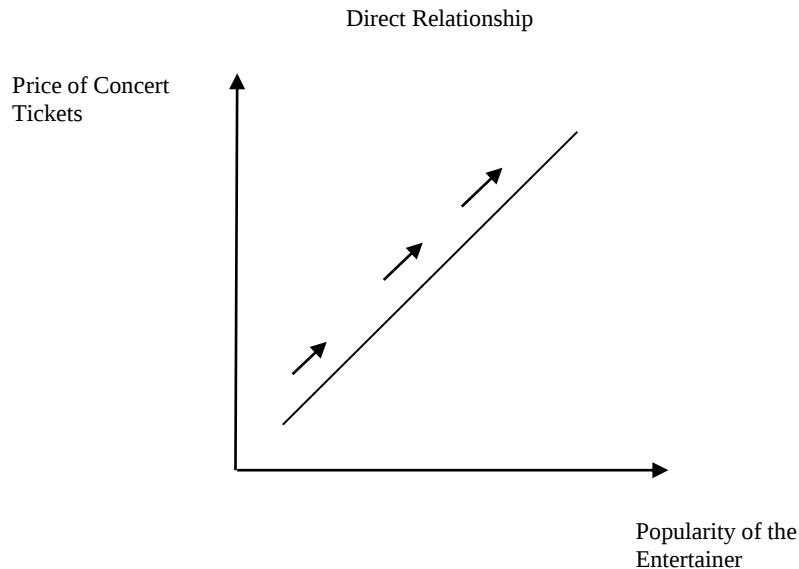
Part a: The number of inches of rainfall per month and the sale of umbrellas: There is likely a direct relationship between the number of inches of rainfall per month and the sale of umbrellas (more rain implies more umbrellas).



Part b: The amount of tuition and the level of enrollment at a university: There is likely an inverse relationship between the amount of tuition and the level of enrollment at a university. As tuition increases less students will attend the university.



Part c: The popularity of an entertainer and the price of her concert tickets: There is likely a direct relationship between the popularity of an entertainer and the price of her concert tickets. The more popular the entertainer, the more people are willing to pay to see her in concert.



2. Indicate how each of the following might affect the data shown in Figure A1-2 of this appendix: **LO A1-1**

- a. IU's athletic director schedules higher-quality opponents.
- b. A National Basketball Association (NBA) team locates in the city where IU also plays.
- c. IU signs a contract to have all its home games televised.

Answer: (a) increase in demand; shift to the right; (b) decrease in demand; shift to the left; (c) decrease in demand; shift to the left.

Feedback: Consider the three scenarios:

Part a: IU's athletic director schedules higher-quality opponents. By scheduling higher quality opponent there will be an increase in demand. That is, more tickets will be purchased at every price. The demand schedule will shift to the right.

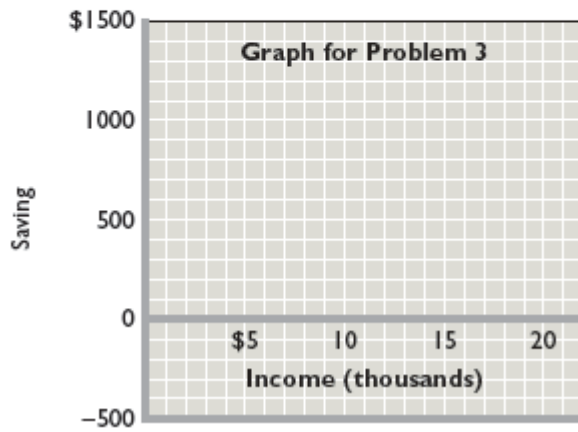
Part b: An NBA team locates in the city where IU plays. If an NBA team locates in the same city, this will reduce demand because the NBA team's games are likely substitutes for IU's games. That is, fewer tickets will be purchased at every price. The demand schedule will shift to the left.

Part c: IU contracts to have all its home games televised. If IU contracts to have its entire home games televised, this will reduce demand because individuals can watch the game on television. That is, fewer tickets will be purchased at every price. The demand schedule will shift to the left.

3. The following table contains data on the relationship between saving and income. Rearrange these data into a meaningful order and graph them on the accompanying grid. What is the slope of

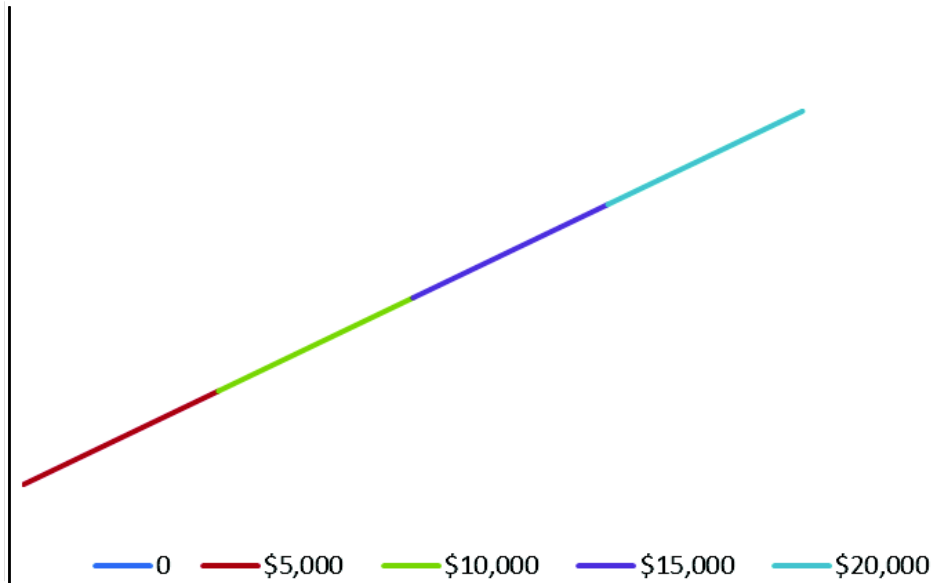
the line? What is the vertical intercept? Write the equation that represents this line. What would you predict saving to be at the \$12,500 level of income? **LO A1-1**

Income per Year	Saving per Year
\$15,000	\$1,000
0	−500
10,000	500
5,000	0
20,000	1,500



Answer:

Income per Year	Saving per Year
0	-\$500
\$5,000	0
\$10,000	\$500
\$15,000	\$1,000
\$20,000	\$1,500



Slope equals $(500/5000)$ or 0.10 ; the vertical intercept equals $-\$500$. The equation representing this data is : $\text{Saving} = -\$500 + 0.1 \times \text{Income}$. The predicted level of saving is $\$750$.

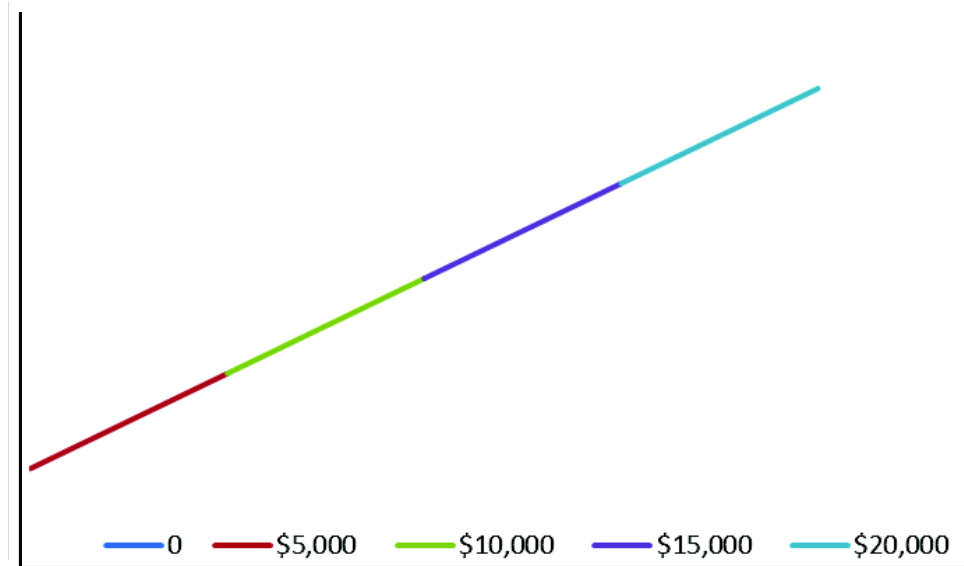
Feedback: Consider the following data:

Income per Year	Saving per Year
\$15,000	\$1,000
0	-\$500
\$10,000	\$500
\$5,000	0
\$20,000	\$1,500

To rearrange the above data into a meaningful order, we start with the lowest income and saving pair. We then continue with sequentially higher values of both income and saving. The reason for this ordering is that economic theory (and data) suggests that as income increases so does saving. The data are reordered as follows (you could also reorder from highest to lowest, but this is less intuitive).

Income per Year	Saving per Year
0	-\$500
\$5,000	0
\$10,000	\$500
\$15,000	\$1,000
\$20,000	\$1,500

Graphically, we have the following.

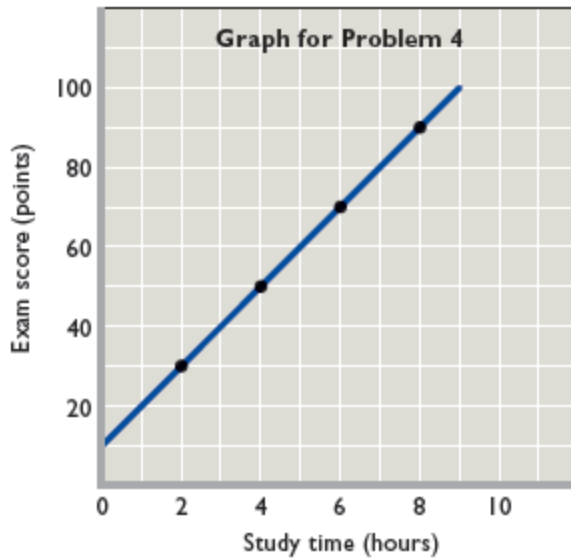


The slope of the saving line can be found by dividing the change in saving by the change in income between any two points. For example we have the entry (5000 (income), 0 (savings)) and the entry (10000 (income), 500 (savings)). This implies that the change in saving equals 500 minus zero (= 500) and the change in income equals 10000 minus 5000 (= 5000), therefore the slope equals (500/5000) or 0.10. That is, for every additional dollar an individual earns (net income) he or she will save 10 cents and consume 90 cents. The vertical intercept equals -\$500. This implies that if the individual does not earn an income he or she either borrows \$500 or reduces past savings (stock variable) by \$500.

The equation representing this data is : $\text{Saving} = -\$500 + 0.1 \times \text{Income}$.

To find the predicted amount of saving for a given level of income we substitute the income level into the equation above. For example if income equals \$12,500, then the predicted level of saving equals $-\$500 + 0.1 \times \$12,500$. Thus the predicted level of saving is \$750 ($= -\$500 + \1250).

4. Construct a table from the data shown on the graph below. Which is the dependent variable and which the independent variable? Summarize the data in equation form. **LO A1-1**

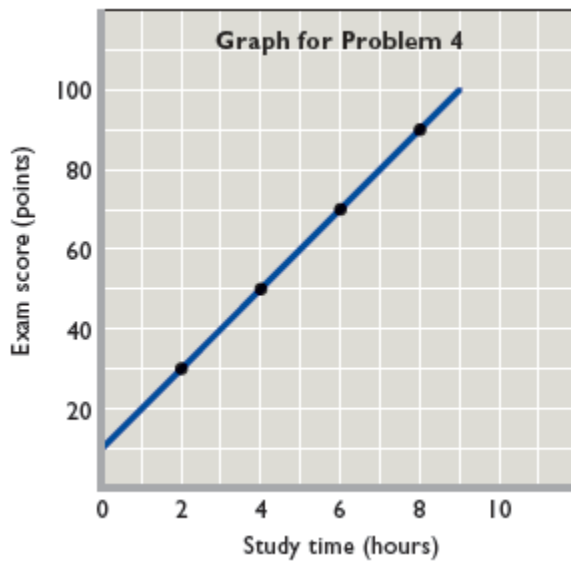


Answer:

Study Time (hours)	Exam Score (points)
0	10
2	30
4	50
6	70
8	90

The dependent variable is Exam Score (points); Study Time (hours) is the independent variable. Thus, the equation representing this relationship is: Exam Score = 10 + 10 x Study Time.

Feedback: Consider the following figure:



The table for this data is as follows:

Study Time (hours)	Exam Score (points)
0	10
2	30
4	50
6	70
8	90

The dependent variable is Exam Score (points) because we assume Study Time (hours) influences your score. The more hours you spend studying will increase your exam score. This means that Study Time (hours) is the independent variable.

The vertical intercept for this relationship is your exam score if you choose not to study (zero hours). From the table above this value is 10.

To find the slope we divide the change in your Exam Score by the change in Study Time for any two points. For example we have the entry (2 (study time), 30 (exam score)) and the entry (4,50). This implies the slope equals (50-30) divided by (4-2), which equals 20/2 (= 10). For every additional hour you spend studying your exam score will increase by 10 point.

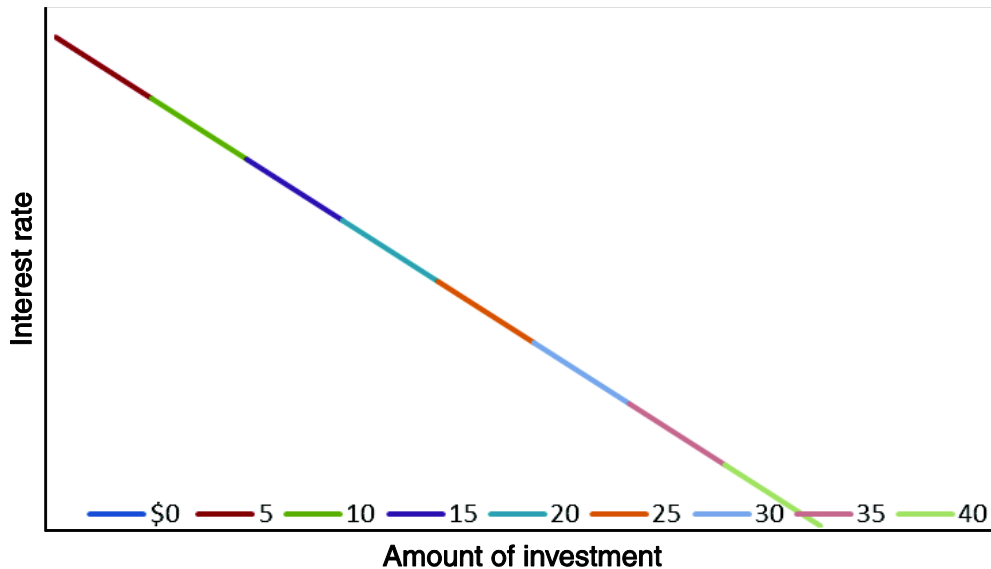
Thus, the equation representing this relationship is: Exam Score = 10 + 10 x Study Time

5. Suppose that when the interest rate on loans is 16 percent, businesses find it unprofitable to invest in machinery and equipment. However, when the interest rate is 14 percent, \$5 billion worth of investment is profitable. At 12 percent interest, a total of \$10 billion of investment is profitable. Similarly, total investment increases by \$5 billion for each successive 2-percentage-point decline in the interest rate. Describe the relevant relationship between the interest rate and investment in a table, graphically, and as an equation. Put the interest rate on the vertical axis and investment on the horizontal axis. In your equation use the form $i = a - bI$, where i is the interest rate, a is the vertical intercept, b is the slope of the line (which is negative), and I is the level of investment. **LO A1-1**

Answer:

Interest rate (in percent)	Amount of investment (billions of dollars)
16	\$ 0
14	5
12	10
10	15
8	20
6	25
4	30
2	35
0	40

Equation: $i = 16 - (2/5)I$ or $i = 16 - (0.4)I$



Feedback: Consider the following data as an example:

Suppose that when the interest rate on loans is 16 percent, businesses find it unprofitable to invest in machinery and equipment. However, when the interest rate is 14 percent, \$5 billion worth of investment is profitable. At 12 percent interest, a total of \$10 billion of investment is profitable. Similarly, total investment increases by \$5 billion for each successive 2-percentage-point decline in the interest rate.

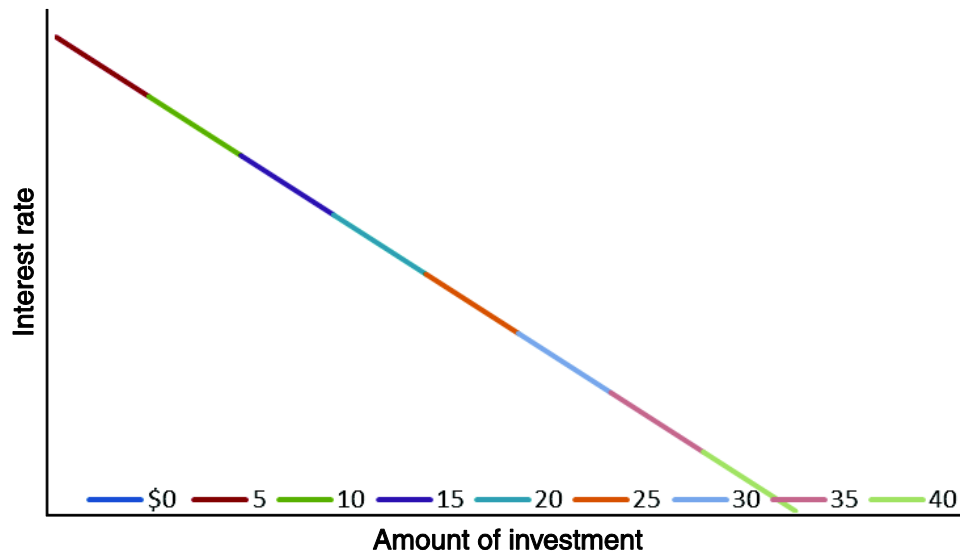
Interest rate (in percent)	Amount of investment (billions of dollars)
16	\$ 0
14	5
12	10
10	15
8	20
6	25
4	30
2	35
0	40

When the interest rate is 16%, investment spending will be zero. When the interest rate is 14%, investment spending will be \$5 billion. For each successive drop of 2 percentage points in the interest rate, investment spending will increase by \$5 billion.

Using equation $i = a - bI$

$$\begin{aligned}
 i &= 16 - [(16 - 14)/(5 - 0)] \times I \\
 &= 16 - \left(\frac{2}{5}\right)I \\
 &= 16 - 0.4I
 \end{aligned}$$

Graphically we have the following relationship.



6. Suppose that $C = a + bY$, where C = consumption, a = consumption at zero income, b = slope, and Y = income. LO A1-1

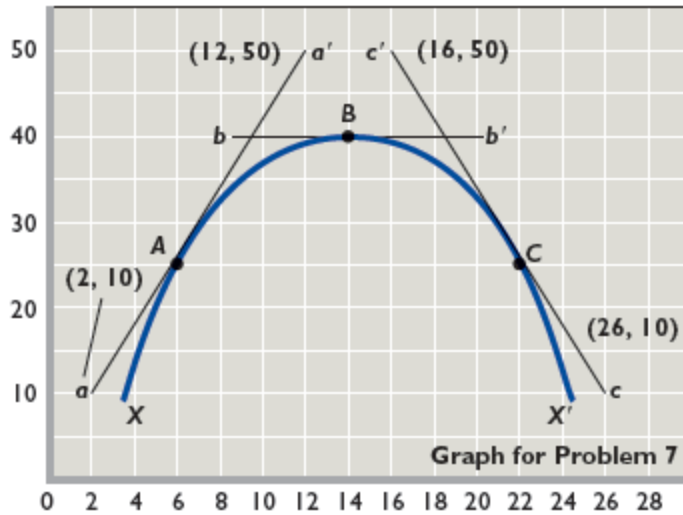
- Are C and Y positively related or are they negatively related?
- If graphed, would the curve for this equation slope upward or slope downward?
- Are the variables C and Y inversely related or directly related?
- What is the value of C if $a = 10$, $b = 0.50$, and $Y = 200$?
- What is the value of Y if $C = 100$, $a = 10$, and $b = 0.25$?

Answers: (a) positively related; (b) upward; (c) directly related; (d) $C = 110$; (e) $Y = 360$.

Feedback:

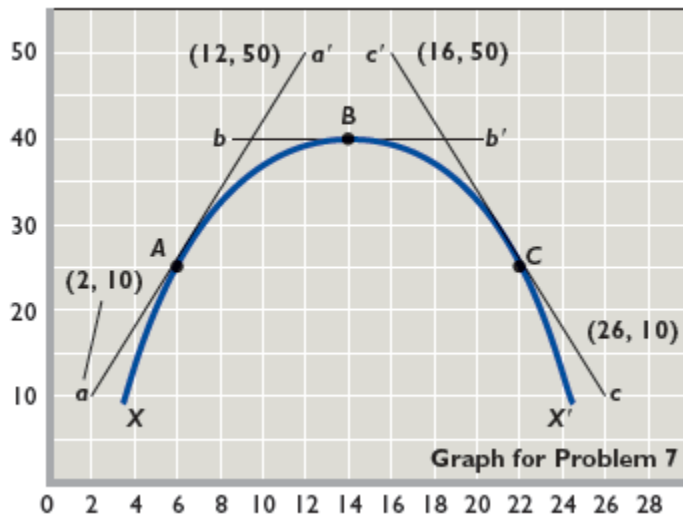
- C and Y are positively related because the slope, b , is positive by assumption. As individual income increases the individual will spend some of this additional income on consumption.
- The curve would slope upward because the slope is positive.
- C and Y are directly related because C and Y are positively related (move in the same direction).
- Consider the following values: If $a = 10$, $b = 0.50$, and $Y = 200$, then $C = 110$. If $a = 10$ and $b = 0.50$, then the consumption function takes the following form $C = 10 + 0.50 \times Y$. If income equals 200, $Y = 200$, then consumption at this level of income equals $C = 10 + 0.50 \times 200 = 110$.
- Consider the following values: Y if $C = 100$, $a = 10$, and $b = 0.25$, then $Y = 360$. If $a = 10$ and $b = 0.25$, then the consumption function takes the following form $C = 10 + 0.25 \times Y$. We can solve for Y as a function of C .
 STEP 1: $0.25 \times Y = C - 10$
 STEP 2: $Y = (1/0.25) \times C - (10/0.25) = 4 \times C - 40$
 STEP 3: Substitute in the value of consumption given, $C = 100$. $Y = 4 \times 100 - 40 = 360$.

7. The accompanying graph shows curve XX' and tangents at points A , B , and C . Calculate the slope of the curve at these three points. LO A1-1



Answer: Point A, slope = 4; Point B, slope = 0; Point C, slope = -4.

Feedback: Consider the following figure as an example:



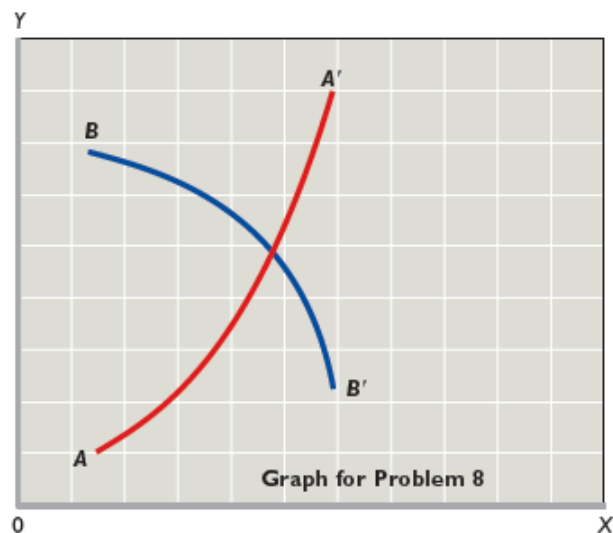
To calculate the slope of the function use the "rise-over-run" approach. The "rise" is the change in the variable on vertical axis as you move between entries (points) and the "run" is the change in the variable on the horizontal axis as you move between the SAME two entries (points).

Point A has a slope that equals 4. To see this we use the two entries (2,10) and (12,50). The "rise" equals $50 - 10 = 40$. The "run" equals $12 - 2 = 10$. To find the slope we use the rule "(rise/run)", which equals $(40/10) = 4$.

Point B has a slope equal to zero. There is no "rise" here, so we do not need coordinates to calculate this value.

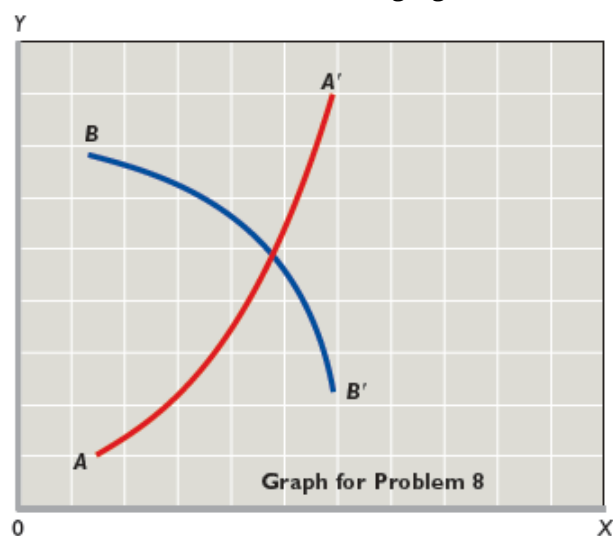
Point C has a slope that equals -4. To see this we use the two entries (16,50) and (26,10). The "rise" equals $10 - 50 = -40$ (note that "rise" can be negative). The "run" equals $26 - 16 = 10$. To find the slope we use the rule "(rise/run)", which equals $(-40/10) = -4$.

8. In the accompanying graph, is the slope of curve AA' positive or negative? Does the slope increase or decrease as we move along the curve from A to A' ? Answer the same two questions for curve BB' . Provide LO A1.1



Answer: Slope of AA' is positive; increases; Slope of BB' is negative; decreases.

Feedback: Consider the following figure:



Slope of AA' is positive (rising from left to right). The slope increases as we move from A to A' . Slope of BB' is negative (dropping from left to right). The slope becomes more negative, thereby decreasing, as we move from B to B' .