

5. All homeless people who are panhandlers are destitute individuals. Therefore, all homeless people are destitute individuals.
6. Some diplomats are clever spies, since some diplomats are clever and some diplomats are spies.
- ★7. All community colleges with low tuition are either schools with large enrollments or institutions supported by taxes. Therefore, all community colleges are institutions supported by taxes.
8. All merchandisers that are retailers are businesses that are inventory rotators. Therefore, all merchandisers are inventory rotators.
9. All diabetes victims are either insulin takers or glucose eliminators. Some diabetes victims are insulin takers. Therefore, some diabetes victims are glucose eliminators.
- ★10. All reverse mortgages that are FHA loans are either living standard enhancers or home equity depleters. All reverse mortgages are home equity depleters. Therefore, all FHA loans are living standard enhancers.

## 1.6

### Extended Arguments

The logical analysis of extended arguments, such as those found in editorials, essays, and lengthy letters to newspaper editors, involves numerous difficulties. Such arguments are often mixed together with fragments of reports, pieces of expository writing, illustrations, explanations, and statements of opinion. Proper analysis involves weeding out the extraneous material and isolating premises and conclusions. Another problem stems from the fact that lengthy arguments often involve complex arrangements of subarguments that feed into the main argument in various ways. Distinguishing one subargument from another is often a complicated task. And then there are some argumentative passages that involve completely separate strands of argumentation leading to separate conclusions. Again, distinguishing the strands and assigning premises to the right conclusion not only is problematic but often involves an element of creativity on the part of the analyst.

To facilitate the analysis of extended arguments, we will assign numerals to the various statements in the passage and use arrows to represent the inferential links. Example:

- ① The contamination of underground aquifers represents a pollution problem of catastrophic proportions. ② Half the nation's drinking water, which comes from these aquifers, is being poisoned by chemical wastes dumped into the soil for generations.

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This argument is diagrammed as follows:

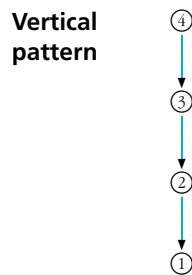


The diagram says that statement ②, the premise, supports statement ①, the conclusion.

In extended arguments we can identify two distinct patterns of argumentation, which we will name the vertical pattern and the horizontal pattern. The *vertical pattern* consists of a series of arguments in which a conclusion of a logically prior argument becomes a premise of a subsequent argument. Example:

① The selling of human organs, such as hearts, kidneys, and corneas, should be outlawed. ② Allowing human organs to be sold will inevitably lead to a situation in which only the rich will be able to afford transplants. This is so because ③ whenever something scarce is bought and sold as a commodity, the price always goes up. ④ The law of supply and demand requires it.

This argument is diagrammed as follows:



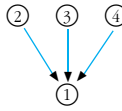
The diagram says that statement ①, which is the main conclusion, is supported by ②, which in turn is supported by ③, which in turn is supported by ④.

The *horizontal pattern* consists of a single argument in which two or more premises provide independent support for a single conclusion. If one of the premises were omitted, the other(s) would continue to support the conclusion in the same way. Example:

① The selling of human organs, such as hearts, kidneys, and corneas, should be outlawed. ② If this practice is allowed to get a foothold, people in desperate financial straits will start selling their own organs to pay their bills. Alternately, ③ those with a criminal bent will take to killing healthy young people and selling their organs on the black market. ④ In the final analysis, the buying and selling of human organs comes just too close to the buying and selling of life itself.

The diagram for this argument is as follows:

**Horizontal  
pattern**

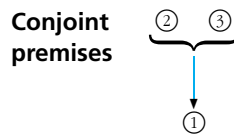


This diagram says that statements ②, ③, and ④ support ① independently.

Two variations on the horizontal and vertical patterns occur when two or more premises support a conclusion *conjointly*, and when one or more premises supports *multiple* conclusions. The first variation occurs when the premises depend on one another in such a way that if one were omitted, the support that the others provide would be diminished or destroyed. The following argument illustrates the occurrence of conjoint premises:

- ① Getting poor people off the welfare rolls requires that we modify their behavior patterns. ② The vast majority of people on welfare are high school dropouts, single parents, or people who abuse alcohol and drugs. ③ These behavior patterns frustrate any desire poor people may have to get a job and improve their condition in life.

Statement ① is the conclusion. Taken separately, statements ② and ③ provide little or no support for ①, but taken together they do provide support. That is, ② and ③ support ① *conjointly*. This relationship between the premises is illustrated by the use of the brace in the following diagram:



The next example illustrates the occurrence of a multiple conclusion:

- ① Dropping out of school and bearing children outside of marriage are two of the primary causes of poverty in this country. Therefore, ② to eliminate poverty we must offer incentives for people to get high school diplomas. Also, ③ we must find some way to encourage people to get married before they start having children.

In this passage statement ① supports both ② and ③. Since no single argument can have more than one conclusion, the passage is correctly evaluated as consisting of two arguments. For our purposes, however, we will treat it as if it were a single argument by joining the two conclusions with a brace:



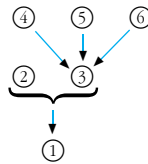
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Our symbolism is now sufficiently developed to analyze most arguments found in editorials and letters to the editor of newspapers and magazines. Consider the following argument, taken from a newspaper editorial:

① Government mandates for zero-emission vehicles won't work because ② only electric cars qualify as zero-emission vehicles, and ③ electric cars won't sell. ④ They are too expensive, ⑤ their range of operation is too limited, and ⑥ recharging facilities are not generally available.

(William Campbell, "Technology Is Not Good Enough")

We immediately see that ① is the main conclusion, and ② and ③ support ① conjointly. Also, ④, ⑤, and ⑥ support ③ independently. The argument pattern is as follows:

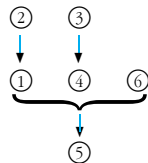


The next argument is taken from a letter to the editor:

① Rhinos in Kenya are threatened with extinction because ② poachers are killing them for their horn. Since ③ the rhino has no natural predators, ④ it does not need its horn to survive. Thus ⑤ there should be an organized program to capture rhinos in the wild and remove their horn. ⑥ Such a program would eliminate the incentive of the poachers.

(Pamela C. Wagner, "Rhino Poaching")

First we search for the final conclusion. We select ⑤, because it is the ultimate point that the passage attempts to establish. Next we survey the premise and conclusion indicators. From this, we see that ② supports ① and ③ supports ④. Finally, we see that ①, ④, and ⑥ support ⑤. Yet these supporting statements depend on one another for their effect. Thus they support the final conclusion conjointly. The argument pattern is as follows:



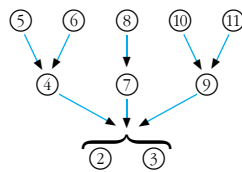
The next argument is taken from a magazine article:

① Skating is a wonderful form of exercise and relaxation, but ② today's roller-bladers are a growing menace and ③ something should be done to control them.

④ Rollerbladers are oblivious to traffic regulations as ⑤ they breeze through red lights and ⑥ skim down the wrong way on one-way streets. ⑦ They pose a threat to pedestrians because ⑧ a collision can cause serious injury. ⑨ Rollerbladers are even a hazard to shopkeepers as ⑩ they zoom through stores and ⑪ damage merchandise.

(Joan Schmidt, "Hell—On Wheels")

After reading the argument, we see that ① is merely an introductory sentence, and ② and ③ together compose the main conclusion. Also, ④, ⑦, and ⑨ support the main conclusion independently, while ⑤ and ⑥ support ④ independently, ⑧ supports ⑦, and ⑩ and ⑪ support ⑨ independently. The diagram is as follows:

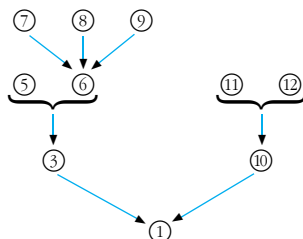


The next argument is taken from the science column of a newspaper:

① We can expect small changes to occur in the length of our calendar year for an indefinite time to come. ② This is true for two reasons. ③ First, the rotation of the earth exhibits certain irregularities. ④ And why is this so? ⑤ The rotation of any body is affected by its distribution of mass, and ⑥ the earth's mass distribution is continually subject to change. For example, ⑦ earthquakes alter the location of the tectonic plates. Also, ⑧ the liquid core of the earth sloshes as the earth turns, and ⑨ rainfall redistributes water from the oceans. The second reason is that ⑩ the motion of the tides causes a continual slowing down of earth's rotation. ⑪ Tidal motion produces heat, and ⑫ the loss of this heat removes energy from the system.

(Isaac Asimov, "As the World Turns")

Preliminary analysis reveals that the final conclusion is ①. Also, ② tells us that the supporting statements are divided into two basic groups, but since ② does not add any support, we can leave it out of the diagram. In the first group, ⑤ and ⑥ support ③ conjointly, while ⑦, ⑧, and ⑨ support ⑥ independently. ④ will not appear in the diagram, because it serves merely as a premise indicator. In the second group, ⑪ and ⑫ support ⑩ conjointly. Thus the argument pattern is as follows:



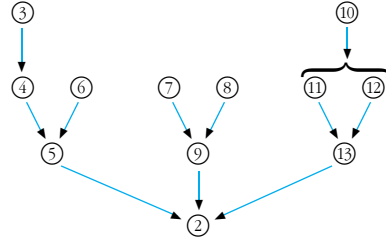
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Our last example is taken from a letter to the editor of a newspaper:

① Community college districts save a great deal of money by hiring untenured part-time instructors, but ② the extensive use of these instructors is a disadvantage to the students. ③ Most part-time instructors are paid only 60 percent of what a full-time teacher earns, and as a result, ④ they are forced to teach five or six courses just to survive. ⑤ This detracts from the opportunity to consult with students outside the classroom. To make matters worse, ⑥ many part-timers are not even given office space. Furthermore, ⑦ the lower pay demoralizes the part-timer, and ⑧ the lack of tenure makes for constant financial insecurity. ⑨ Obviously these conditions render the instructor less receptive to student needs. Lastly, because ⑩ these part-timers are burning the candle from both ends, ⑪ they have no spare energy to improve their courses, and ⑫ many lack the enthusiasm to motivate their students. As a result, ⑬ the educational process is impaired.

(Gordon Dossett et al., "Part-Time College Instructors")

Preliminary analysis reveals that the main conclusion is not ① but ②. Also, we see three main reasons why part-timers are a disadvantage to students: They have little opportunity to consult with students, they are less receptive to student needs, and the educational process is impaired by ⑪ and ⑫. In the first main branch, the indicator "as a result" shows that ③ supports ④, and ④ and ⑥ independently support ⑤. In the second branch, ⑦ and ⑧ independently support ⑨. In the third, ⑩ supports both ⑪ and ⑫, which in turn support ⑬ independently. Here is the argument pattern:



### EXERCISE 1.6

- LC** I. The following arguments were abstracted from newspaper articles, editorials, and letters to the editor. Use the method presented in this section to construct argument patterns. If a statement is redundant or plays no role in the argument, do not include it in the pattern.
- ★1. ① The conditions under which many food animals are raised are unhealthy for humans. ② To keep these animals alive, large quantities of drugs must be administered. ③ These drugs remain in the animals' flesh and are passed on to the humans who eat it.

(Philip D. Oliver, "We Can Eat Ribs and Still Be Humane")

2. ① The development of carbon-embedded plastics, otherwise called “composites,” is an important new technology because ② it holds the key for new aircraft and spacecraft designs. This is so because ③ these composites are not only stronger than steel but lighter than aluminum.  
(Thomas H. Maugh II, “Composites—The Lightweight Champs of Aircraft Industry”)
3. ① Homework stifles the thrill of learning in the mind of the student. ② It instills an oppressive learn-or-else discipline. ③ It quenches the desire for knowledge and the love of truth. For these reasons ④ homework should never be assigned.  
(Colman McCarthy, “Homework’s Tyranny Hobbles Promising Minds”)
- ★4. ① When parents become old and destitute, the obligation of caring for them should be imposed on their children. ② Clearly, children owe a debt to their parents. ③ Their parents brought them into the world and cared for them when they were unable to care for themselves. ④ This debt could be appropriately discharged by having grown children care for their parents.  
(Gary Jones, “The Responsibility of Parents”)
5. ① Deciphering the human genetic code will be expensive, but ② it will certainly benefit the human race. ③ Humankind is currently afflicted with 3000 inherited disorders, and ④ knowing the genetic code will pave the way for cures.  
(Robert Gillette, “Three Billion Dollar Effort”)
6. ① The rain forest of Brazil produces oxygen for the whole world, yet ② it yields no monetary return to that country. Given that ③ the industrialized nations consume the most oxygen, ④ those nations ought to pay Brazil an annual fee for the use of its rain forest.  
(Diane B. Robinson, letter to the editor)
- ★7. ① It appears that animals may be able to predict earthquakes. ② Prior to a major quake in China, hundreds of snakes suddenly appeared from hibernation and froze to death in the snow, ③ fish were seen leaping from rivers and lakes, and ④ cows and horses refused to enter barns. Also, ⑤ prior to a quake in Fremont, California, a flood of callers reported strange behavior from their pets and domestic animals.  
(Michael Bowker, “Can Animals Really Predict Earthquakes?”)
8. ① It is important today that more of our college students study Russian. ② In the years ahead, we will need to interact effectively with the Russian people, so ③ we must become familiar with their values and traditions. But this entails that ④ we must learn to speak the Russian language.  
(James O. Freedman, “Our New Cultural Imperative”)
9. ① Research leading to the development of a scramjet engine is worthwhile. ② Commercial aircraft incorporating such an engine could cross the Pacific in as little as two hours. ③ This would relieve the fatigue of flights from

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ew York to Tokyo. Also, ④ such an engine could power future orbiting spacecraft.

(T. A. Heppenheimer, "A Plane for Space")

- ★10. ① A worldwide ban on the sale of ivory is long overdue. ② Without it, the African elephant will become virtually extinct by the year 2000. ③ Today, poachers armed with AK-47 automatic rifles kill 2000 elephants every week, and ④ only 600,000 remain in the wild.

(Allan Thornton, "The Ivory Trail")

**LC** II. The following arguments were abstracted from the same sources as those in Part I of this exercise, but they are of gradually increasing difficulty. Use the method presented in this section to construct argument patterns. If a statement is redundant or plays no role in the argument, do not include it in the pattern.

- ★1. ① Many people believe that the crime of bribery cannot extend to campaign contributions. ② From a legal standpoint, however, countless campaign contributions are in fact bribes. ③ A bribe is anything of value or advantage given with the intent to unlawfully influence the person to whom it is given in his official capacity. ④ A campaign contribution is certainly something of value or advantage. Furthermore, ⑤ every contribution from a lobbyist or special interest group is given with the intent to influence voting, and ⑥ thousands of such contributions are made in every important election.

(Daniel Hays Lowenstein, "Can Candidates Run for Political Office Without Taking Bribes?")

2. ① America's farm policy desperately needs revamping. ② Seventy-three cents of every farm program dollar ends up in the pockets of the nation's super-farmers. As a result, ③ the mid-sized family farms are being squeezed out of existence. Also, ④ our farm policy courts environmental disaster. ⑤ Federal subsidies encourage farmers to use enormous amounts of fertilizer and pesticides. ⑥ These chemicals percolate down through the soil and pollute limited groundwater.

(Osha Gray Davidson, "Rise of America's Rural Ghetto")

3. ① Society values white lives more than black lives. This is clear from the fact that ② killers of whites are much more likely to be sentenced to death than killers of blacks. ③ Of the 1788 people currently on death row, 1713 were convicted of killing a white person. Yet ④ blacks are six times more likely to be murder victims than whites are. ⑤ In Florida, no one has ever been executed for murdering a black person, but ⑥ dozens have been executed for murdering white people.

(*Los Angeles Times* editorial, "Death and Race")

- ★4. ① Powerful new particle accelerators are important in high energy physics, and ② they are worth their cost because ③ they will allow scientists to produce and capture significant quantities of Z particles. ④ Z particles result from



the collision of positrons and electrons, and ⑤ particle accelerators are needed to achieve significant numbers of these collisions. ⑥ Z particles are thought to be the bearers of the weak nuclear force, and ⑦ learning the nature of this force may lead to the development of entirely new sources of energy.

(Lee Dye, "Linear Collider: Bold Gamble in Atomic Physics")

5. ① For years our country has been providing Japan unlimited access to our technology while getting little in return. ② Currently 7000 Japanese graduate students study science and engineering in the U.S., ③ while only 1000 Americans are engaged in similar studies in Japan. Also, ④ our government laboratories are open to the Japanese, but ⑤ Japanese laboratories are not open to Americans. ⑥ To remedy this imbalance, Japan should subsidize our universities, and also ⑦ it should help defray the costs of our laboratories.

(William C. Norris, "Technology Must Travel 2-Way Street")

6. ① All men crave material success because ② it serves as an insurance policy against sexual rejection. This is true because ③ women love men who are successful. ④ Both men and women want power, and ⑤ success is the form of power women feel most deprived of. Thus, ⑥ women try to achieve it vicariously through men. ⑦ As the 5-foot 6-inch Dustin Hoffman once put it, "When I was in high school, women wouldn't touch me with a 10-foot pole. Now I can't keep them away with a 10-foot pole."

(Warren Farrell, "Success Story: From Frog to Prince")

- ★7. ① Cigarette consumption could be easily reduced by simply outlawing tailor-made cigarettes. ② The manufacture of tailor-made cigarettes to American standards is a high-tech industry. ③ It cannot be done in small illicit labs like the processing of PCP, cocaine or heroin. ④ The availability of quality tobacco for hand-rolling would discourage the development of an illegal tailor-made market. ⑤ Most people would not pay the premium prices demanded by an illicit market for a product of unknown quality. ⑥ They could roll a high-quality product for themselves. ⑦ Truly addicted persons would continue to smoke no matter how inconvenient. But ⑧ most would give it up as too much bother before it became a deeply ingrained habit.

(Richard Sand, "An Easy Way to Reduce Cigarette Consumption")

8. ① Flesh food is not a necessity in the human diet, as ② nutritionally adequate alternatives are readily available. ③ Many people in the world thrive on a nonmeat diet. ④ Indeed, vegetarian Seventh-Day Adventists in this country live an average of six years longer than their meat-eating counterparts. ⑤ The National Academy of Science warns that our fat-laden diet is directly responsible for much of the heart disease and cancer that afflict so many. ⑥ At a time when people are starving in certain parts of the world, it should be noted that a steer must consume sixteen pounds of grain and soy to produce one pound of meat. ⑦ The grain and soybeans we feed our meat-producing

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animals would feed every hungry mouth in the world many times over. ⑧ Cattle are competing with humans for food. ⑨ Clearly, a reassessment of the whole concept of killing and eating animals is in order.

(Suzanne Sutton, "Killing Animals for Food—Time for a Second Look")

9. ① The argument has been made that to cut down on teenage drunk driving we should increase the federal excise tax on beer. ② Such a measure, however, would almost certainly fail to achieve its intended result. ③ Teenagers are notoriously insensitive to cost. ④ They gladly accept premium prices for the latest style in clothes or the most popular record albums. And then, ⑤ those who drink and drive already risk arrest and loss of driving privileges. ⑥ They would not think twice about paying a little more for a six-pack. Finally, ⑦ the situation is not as bleak as it has been made to appear. ⑧ The fatality rate for teenage drivers is lower today than it has been in years.

(James C. Sanders, "Increased U.S. Tax on Beer")

- ★10. ① It has been widely acknowledged that the quality of undergraduate education in this country is diminishing. ② An often unrecognized cause of this malady is the exploitative way that universities as employers treat their part-time and temporary faculty members. ③ In many universities there are no formal guidelines for evaluating the work of these instructors. As a result, ④ poor instructors who solicit the favor of the department chairman are often retained over better ones who do not. ⑤ Another factor is the low pay given to these instructors. ⑥ In order to survive, many of them must accept heavy teaching loads spread out over three or four institutions. ⑦ The quality of instruction can only suffer when faculty members stretch themselves so thin. Lastly, because ⑧ part-time and temporary faculty are rarely members of the faculty senate, ⑨ they have no voice in university governance. But ⑩ without a voice, the shoddy conditions under which they work are never brought to light.

(Michael Schwalbe, "Part-Time Faculty Members Deserve a Break")

11. ① Doctors who attend elderly people in nursing homes often prescribe tranquilizers to keep these people immobile. ② This practice is often unwarranted, and ③ it often impairs the health of the patients. ④ These tranquilizers often have damaging side effects in that ⑤ they accentuate the symptoms of senility, and ⑥ they increase the likelihood of a dangerous fall because ⑦ they produce unsteadiness in walking. Furthermore, since ⑧ these medications produce immobility, ⑨ they increase the risk of bedsores. ⑩ Doctors at the Center for Aging and Health say that physicians who care for the elderly are simply prescribing too much medication.

(Hal Willard, "At 90, the Zombie Shuffle")

12. ① All of us have encountered motorists who will go to any length to get a parking spot within 20 feet of the door they expect to enter. ② This obsession with good parking spots transcends all logic. ③ It might take 5 minutes to

secure the ideal spot in a store parking lot, ④ while a more distant spot that is immediately available is only a 40-second walk from the door. ⑤ Waiting for that ideal spot also results in frenzied nerves and skyrocketing blood pressure. ⑥ Inevitably the occupant of the desired space will preen her hair before departing, and ⑦ all the while the cars backed up behind the waiting driver are blaring their horns. ⑧ Parking a little farther away is usually easier and safer because ⑨ you can pull out more quickly, and ⑩ it avoids damage to car doors by adjacent parkers.

(Gwinn Owens, "A Ridiculous Addiction")

- ★13. ① The state has a right to intervene on behalf of unborn children, and ② this right should be implemented immediately. ③ While it may be true that a mere fetus has no rights, ④ surely a born child does have rights, and ⑤ these rights project backward to the time it was in the womb. This is true because ⑥ what happens to the child in the womb can have an impact throughout the child's life. ⑦ It is well known that alcohol and drug abuse by expectant mothers cause birth defects, and ⑧ these defects are not correctable after birth. ⑨ Granted, an expectant mother has the right to treat her own body as she chooses, but ⑩ this right does not extend to her unborn child. ⑪ Once a pregnant woman decides to give birth, she effectively transfers part of her rights over to her unborn child. ⑫ Unfortunately, however, the unborn child is incapable of securing these rights for itself. Thus, ⑬ the intervention of a higher power is justified.

(Alan Dershowitz, "Drawing the Line on Prenatal Rights")

14. ① A manned trip to Mars is a justified scientific goal because ② it affords a unique opportunity to explore the origins of the solar system and the emergence of life. However, ③ from a scientific standpoint, an initial landing on the tiny Martian moons, Phobos and Deimos, would be more rewarding than a landing on the planet itself. Because ④ the Martian terrain is rugged, ⑤ humans would not be able to venture far, ⑥ nor could they operate a robot vehicle without the use of a satellite, since ⑦ Mars's mountains would block their view. ⑧ Explorers on Phobos and Deimos could easily send robot vehicles to the planet's surface. ⑨ Using Mars's moons as a base would also be better than unmanned exploration directed from the Houston space center. Because ⑩ the distance is so great, ⑪ radio signals to and from Mars can take as long as an hour. Thus, ⑫ driving an unmanned rover from Earth, step by step, would be a time-consuming operation. ⑬ Sample returns to Earth would take months instead of hours, and ⑭ follow-on missions would be years apart instead of days, further slowing the process of exploration.

(S. Fred Singer, "The Case for Going to Mars")

15. ① There are lots of problems with the U.S. airline system, but ② deregulation isn't one of them. ③ Airline deregulation has delivered most of what it

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promised when enacted in 1978. ④ It has held down fares, ⑤ increased competition, ⑥ and raised the industry's efficiency. ⑦ Despite claims to the contrary, airline safety has not suffered. And, ⑧ with some exceptions, service to some cities and towns has improved. ⑨ On average, fares are lower today than in 1980. ⑩ Morrison and Winston estimate that fares are 20% to 30% below what they would be under regulation. ⑪ Competition has increased because ⑫ prior to deregulation airlines had protected routes. ⑬ After deregulation this changed. ⑭ Efficiency has also improved. ⑮ After deregulation the percentage of occupied seats jumped by 10% and miles traveled by 32%. ⑯ Despite fears that airlines would cut unprofitable service to small communities, most smaller cities and towns experienced a 20% to 30% increase in flight frequency. Lastly, ⑰ travel on U.S. airlines remains among the safest forms of transportation. ⑱ Between 1975 and 1985, deaths resulting from crashes totaled fewer than 3000.

(Robert J. Samuelson, "Let's Not Regulate the Deregulated Airlines")

- III. Turn to the editorial pages of a newspaper and select an editorial that contains an argument. Keep in mind that some editorials are really reports and contain no arguments at all. Also, few editorials are as neat and straightforward as the selections presented in parts I and II of this exercise. Guest editorials on the opinion-editorial page (usually opposite the editorial page) are often better written than those on the editorial page. Analyze the argument (or arguments) according to the method presented in this section. Begin by placing a numeral at the beginning of each statement. Compound statements having components that are claimed to be true may be broken up into parts and the parts enumerated accordingly. Numerals should usually be placed after genuine premise and conclusion indicators even when they occur in the middle of a statement. Do *not*, however, break up conditional statements into antecedent and consequent. Proceed to identify the main conclusion (or conclusions) and determine how the other statements provide support. Any statement that does not play a direct role in the argument should be left out of the final argument pattern.

## Summary

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Logic is the study of the evaluation of arguments, which are lists of statements consisting of one or more premises and one conclusion. Premises can be distinguished from conclusion by the occurrence of indicator words ("hence," "therefore," "since," and so on) or an inferential relation among the statements. Because not all groups of statements are arguments, it is important to be able to distinguish arguments from nonarguments. This is done by attending to indicator words, the presence of an inferential relation among the statements, and typical kinds of nonarguments. Typical non-

arguments include warnings, loosely associated statements, reports, expository passages, illustrations, conditional statements, and explanations.

Arguments are customarily divided into deductive and inductive. Deductive arguments are those in which the conclusion is claimed to follow necessarily from the premises, while inductive arguments are those in which the conclusion is claimed to follow only probably from the premises. The two can be distinguished by attending to special indicator words (“it necessarily follows that,” “it probably follows that,” and so on), the actual strength of the inferential relation, and typical forms or styles of deductive and inductive argumentation. Typical deductive arguments include arguments based on mathematics, arguments from definition, and categorical, hypothetical, and disjunctive syllogisms. Typical inductive arguments include predictions, arguments from analogy, generalizations, arguments from authority, arguments based on signs, and causal inferences.

The evaluation of arguments involves two steps: evaluating the link between premises and conclusion, and evaluating the truth of the premises. Deductive arguments in which the conclusion actually follows from the premises are said to be valid, and those that also have true premise are said to be sound. Inductive arguments in which the conclusion actually follows from the premises are said to be strong, and those that also have true premises are said to be cogent. The terms “true” and “false” apply not to arguments, but to statements. The truth and falsity of premises and conclusion is only indirectly related to validity, but any deductive argument having true premises and false conclusion is invalid.

The validity of a deductive argument is determined by the form of the argument. An argument form that allows for a substitution instance having true premises and a false conclusion is an invalid form, and any argument having that form is an invalid argument. This fact leads to the counterexample method for proving invalidity. The method consists in identifying the form of a given invalid argument and then constructing a counterexample having premises that are indisputably true and a conclusion that is indisputably false.

The structure of longer arguments may be disclosed by the application of a method consisting of arrows and braces that show how the various premises support intermediate conclusions, and how the latter in turn support the main conclusion. Four basic argument patterns are the vertical pattern, horizontal pattern, conjoint premises, and multiple conclusion.

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