only."[13] As a moral "end," each person (including ourselves) places moral limits on our conduct. These limits are itemized by all valid moral rules stating obligations to others. Some obligations are to refrain from interfering with a person's liberty, and some express requirements to help them when they are in need, thereby paralleling the distinction between liberty and positive rights.

Kant also emphasized that duties are universal: They apply equally to all rational beings (including all humans and supernatural beings like angels and God—whom Kant believed to exist). He stated this idea in another famous sentence: "Act only according to that maxim [that is, rule of action] by which you can at the same time will that it should become a universal law."[14] Here again, the idea is that valid principles of duty apply to all rationally autonomous beings, and hence valid duties will be such that we can envision everyone acting on them. This idea of universal principles is often compared to the Golden Rule: Do unto others as you would have them do unto you; or, in its negative version, Do not do unto others what you would not want them to do to you.[15]

Finally, Kant insisted that moral duties are "categorical imperatives." As imperatives, they are injunctions or commands that we impose on ourselves as well as other rational beings. As categorical, they require us to do what is right *because* it is right, unconditionally and without special incentives attached. For example, we should be honest because honesty is required by duty; it is required by our basic duty to respect the autonomy of others, rather than to deceive and exploit them for our own selfish purposes. "Be honest!" says morality—not because doing so benefits us, but because honesty is our duty. Morality is not an "iffy" matter that concerns hypothetical (conditional) imperatives, such as "If you want to prosper, be honest." A businessperson who is honest solely because honesty pays—in terms of profits from customers who return and recommend their services, as well as from avoiding jail for dishonesty—fails to fully meet the requirements of morality. In this way, morality involves attention to motives and intentions, an idea also important in virtue ethics.

3.2.4 Prima Facie Duties

Kant thought that everyday principles of duty, such as "Do not lie" and "Keep your promises," are *absolute* in the sense of never having justifiable exceptions. In doing so, he conflated three ideas: (1) universality—moral rules apply to all rational agents; (2) categorical imperatives—moral rules command what is right because it is right; and (3) absolutism—moral rules have no exceptions. Nearly all ethicists reject Kant's absolutism, even ethicists who embrace his ideas of universality and categorical imperatives.

The problem with absolutism should be obvious. As we have emphasized, moral reasons are many and varied, including those expressed by principles of duty. Given the complexity of human life, they invariably come into conflict with each other, thereby creating moral dilemmas. Contemporary duty ethicists recognize that many moral dilemmas are resolvable only by recognizing some valid exceptions to simple principles of duty. Thus, engineers have a duty to maintain confidentiality about information owned by their corporations, but that duty can

be overridden by the paramount duty to protect the safety, health, and welfare of the public.

To emphasize that most duties have some justified exceptions, the philosopher David Ross (1877–1971) introduced the expression *prima facie duties*. In this technical sense, prima facie simply means "might have justified exceptions" (rather than "at first glance"). Most duties are prima facie ones—they sometimes have permissible or obligatory exceptions. Indeed, the same is true of most rights and other moral principles, and hence today the term *prima facie* is often applied to rights and rules.

Ross believed that prima facie duties are intuitively obvious, much like Jefferson said that human rights are self-evident. He emphasized, however, that it is not always obvious how best to balance conflicting duties, so as to arrive at our actual duty—our duty in a situation, all things considered. How, then, do we tell which duties should override others when they come into conflict? Ross noted that some principles, such as "Do not kill" and "Protect innocent life," clearly involve more pressing kinds of respect for persons than other principles, such as "Don't lie." Usually, however, general priorities cannot be established. Instead, he argued, we must simply reflect carefully on particular situations, weighing all relevant duties in light of all the facts, and trying to arrive at a sound judgment or intuition.

> When I am in a situation, as perhaps I always am, in which more than one of these *prima facie* duties is incumbent on me, what I have to do is to study the situation as fully as I can until I form the considered opinion (it is never more) that in the circumstances one of them is more incumbent than any other; then I am bound to think that to do this *prima facie* duty is my duty *sans phrase* in the situation [i.e., my actual duty, all things considered].[16]

In emphasizing the need to reflect contextually, as well as acknowledging human fallibility in doing that reasoning, Ross greatly improves on Kant's version of duty ethics. Nevertheless, Ross relies heavily on intuition, and persons sometimes differ in their moral intuitions. Hence, Ross is often criticized for not providing sufficiently detailed moral guidance (a criticism aimed at other ethical theories as well). Most contemporary duty ethicists seek ways to minimize the need for intuitions (immediate judgments) in morality—for example, by underscoring the need for rational dialogue with others and periodic reflection in connecting general rules with specific applications.

DISCUSSION QUESTIONS

1. In the Pinto case, did Ford Motor Company have a duty to inform the public of the hazard with its gas tank, and did the public have rights to be so informed? If so, how might such information have been made available to the public?
2. Revisit the Citicorp tower case in chapter 1. Identify the rights of the various stakeholders involved in the case. How might a rights ethicist proceed in resolving what should have been done?
3. Suppose that you or your family owns, free and clear (without debt) a piece of land. Does a right to property permit you, morally speaking, to do anything you please with it, and are laws that say otherwise immoral? Some philosophers argue that what it

means to say it is your property is largely a matter of what the law says you can and cannot do with it. What would Locke say, and do you agree with him? In your response, which will clarify your conception of what property is, consider right-of-way laws that allow the government to purchase your land at market value in order to construct a road or railway path, environmental laws forbidding pollution of the land, limitations on the height of buildings on the land, etc.

4. Present and defend your view concerning the relative strengths and weaknesses of the views of libertarian rights ethicists and those rights ethicists who believe in both liberty and welfare rights. In doing so, comment on why libertarianism is having considerable influence today, and yet why the Libertarian Party repeatedly cannot win widespread support for its goals to dismantle all welfare programs, such as guaranteed public education from kindergarten to twelfth grade and health care for the elderly and low-income families.
5. Write down a list of duties that you believe all reasonable persons should recognize as absolute, that is, as having no justified exceptions. Is the list very long? Explain why your list is short or long, and defend your view against possible criticism.
6. Americans are sometimes criticized for being too individualistic, and in particular for approaching moral issues with too great an emphasis on rights. Although we said that rights and duties are usually correlated with each other, what difference (if any) do you think would occur if Jefferson had written, "We hold these truths to be self-evident; that all people are created equal; that they owe duties of respect to all other persons, and are owed these duties in return"?
7. What does the Golden Rule imply concerning how engineers and corporations should behave toward customers in designing and marketing products? As a focus, discuss whether crash-test information should be made available to customers concerning the possibly harmful side effects of a particular automobile. Does it matter whether the negative or positive version of the Golden Rule is used? And does either version provide an answer that everyone might find morally reasonable?

3.3 VIRTUE ETHICS

Virtue ethics emphasizes character more than rights and rules. Character is the pattern of virtues (morally desirable features) and vices (morally undesirable features) in an individual. Virtues are desirable habits or tendencies in action, commitment, motive, attitude, emotion, ways of reasoning, and ways of relating to others. Vices are morally undesirable habits or tendencies. The words *virtue* and *vice* sound a bit old-fashioned. Words for specific virtues, however, remain familiar, both in engineering and in everyday life—for example, competence, honesty, courage, fairness, loyalty, and humility. Words for specific vices are also familiar: incompetence, dishonesty, cowardice, unfairness, disloyalty, and arrogance.

3.3.1 Virtues in Engineering

As noted in chapter 1, the Greek word *arete* can be translated as "virtue," "ethics," and "excellence," an etymological fact that reinforces our theme of ethics and excellence going together in engineering. The most comprehensive virtue of engineers is responsible professionalism. This umbrella virtue implies four

(overlapping) categories of virtues: public well-being, professional competence, cooperative practices, and personal integrity.

Public-spirited virtues are focused on the good of clients and the wider public. The minimum virtue is nonmaleficence, that is, the tendency not to harm others intentionally. As Hippocrates reportedly said in connection with medicine, "Above all, do no harm." Engineering codes of professional conduct also call for beneficence, which is preventing or removing harm to others and, more positively, promoting the public safety, health, and welfare. Also important is a sense of community, manifested in faith and hope in the prospects for meaningful life within professional and public communities. Generosity, which means going beyond the minimum requirements in helping others, is shown by engineers who voluntarily give their time, talent, and money to their professional societies and local communities. Finally, justice within corporations, government, and economic practices is an essential virtue in the profession of engineering.

Proficiency virtues are the virtues of mastery of one's profession, in particular mastery of the technical skills that characterize good engineering practice. Following Aristotle, some thinkers regard these values as intellectual virtues rather than distinctly moral ones. As they contribute to sound engineering, however, they are morally desirable features. The most general proficiency virtue is competence: being well prepared for the jobs one undertakes. Also important is diligence: alertness to dangers and careful attention to detail in performing tasks by, for example, avoiding the deficiency of laziness and the excess of the workaholic. Creativity is especially desirable within a rapidly changing technological society.

Teamwork virtues are those that are especially important in enabling professionals to work successfully with other people. They include collegiality, cooperativeness, loyalty, and respect for legitimate authority. Also important are leadership qualities that play key roles within authority-structured corporations, such as the responsible exercise of authority and the ability to motivate others to meet valuable goals.

Finally, *self-governance virtues* are those necessary in exercising moral responsibility.[17] Some of them center on moral understanding and perception: for example, self-understanding and good moral judgment—what Aristotle called practical wisdom. Other self-governance virtues center on commitment and on putting understanding into action: for example, courage, self-discipline, perseverance, fidelity to commitments, self-respect, and integrity. Honesty falls into both groups of self-direction virtues, for it implies truthfulness in speech and belief and trustworthiness in commitments.

3.3.2 Florman: Competence and Conscientiousness

Like rights ethics, duty ethics, and utilitarianism, virtue ethics takes alternative forms, especially in the particular virtues emphasized and their roles in morally good lives. As an illustration, let us contrast Samuel Florman's emphasis on loyalty to employers with Aristotle's emphasis on loyalty to community, referring as

well to Alasdair MacIntyre, who applied Aristotle's perspective to contemporary professions.

Florman is most famous for his celebration of the "existential pleasures" of engineering—the deeply rooted and elemental satisfactions in engineering that contribute to happiness.[18] These pleasures have many sources. There is the desire to improve the world, which engages individuals' sense of personal involvement and power. There is the challenge of practical and creative effort, including planning, designing, testing, producing, selling, constructing, and maintaining, all of which bring pride in achieving excellence in the technical aspects of one's work. There is the desire to understand the world—an understanding that brings wonder, peace, and sense of being at home in the universe. There is the sheer magnitude of natural phenomena—oceans, rivers, mountains, and prairies—that both inspires and challenges the design of immense ships, bridges, tunnels, communication links, and other vast undertakings. There is the presence of machines that can generate a comforting and absorbing sense of a manageable, controlled, and ordered world. Finally, engineers live with a sense of helping, of contributing to the well-being of other human beings.

In elaborating on these pleasures, Florman implicitly sets forth a virtue ethics. In his view, "the essence of engineering ethics" is best captured by the word *conscientiousness*.[19] Engineers who do their jobs well are morally good engineers, and doing their jobs well is to be understood in terms of the more specific virtues of competence, reliability, inventiveness, loyalty to employers, and respect for laws and democratic processes. Competence and loyalty are the two virtues Florman most emphasizes.

On the one hand, conscientious engineers are competent. Florman estimates that 98 percent of engineering failures are caused by incompetence. The other 2 percent involve greed, fraud, dishonesty, and other conventional understandings of wrongdoing, often in addition to sloppiness. "Competent" does not mean minimally adequate, but instead performing with requisite skill and experience. It implies exercising due care, persistence and diligence, and attention to detail and avoiding sloppiness. In addition to competence, conscientious engineering often requires creative problem solving and innovative thinking.

On the other hand, conscientious engineers are loyal to their employers, within the boundaries of laws and democratic institutions. At first glance, this idea sounds like the libertarian view of Milton Friedman discussed in chapter 1. But whereas Friedman called for minimum government regulation, Florman places great emphasis on laws as setting the basic rules governing engineering. Within a democratic setting in which laws express a public consensus, economic competition among corporations makes possible technological achievements that benefit the public. Competition depends on engineers who are loyal to their organizations, which is analogous to how members of a baseball team work together in competition. Like attorneys defending clients, engineers need not believe that their company is always best serving the interests of humanity at large. In fact, engineers should keep their personal commitments largely to themselves, although it is gratifying when they can match their personal convictions to the goals of their

companies. Professional restraints should be laws and government regulations rather than personal conscience. In this view, even professional codes of ethics are largely ceremonial expressions, and "a code with real meaning and teeth is beyond the realm of possibility."[20]

We can agree that engineers should be conscientious in meeting their responsibilities, but the question is which responsibilities take priority. Florman defends the priority of duties to employers, in opposition to professional codes that require engineers to hold "paramount" the safety, health, and welfare of the public. His competence-and-loyalty credo could easily be used to encourage engineers to be passive in accepting the dictates of employers and relying on laws as sufficient to protect the public. Rather than "filtering their everyday work through a sieve of ethical sensitivity," he tells us, professionals have the task of meeting the expectations of their clients and employers.[21] Yet, in some important sense, such "filtering" is exactly what should be expected of engineers in exercising their professional judgment.

3.3.3 Aristotle: Community and The Golden Mean

Aristotle (384–322 B.C.) defined the moral virtues as habits of reaching a proper balance between extremes in conduct, emotion, desire, and attitude.[22] To use the phrase inspired by his theory, virtues are tendencies to find the *Golden Mean* between the extremes of too much (excess) and too little (deficiency) with regard to particular aspects of our lives. Thus, truthfulness is the appropriate middle ground (mean) between revealing all information in violation of tact and confidentiality (excess) and being secretive or lacking in candor (deficiency) in dealing with truth. Again, courage is the mean between foolhardiness (the excess of rashness) and cowardice (the deficiency of self-control) in confronting dangers. The most important virtue is practical wisdom, that is, morally good judgment, which enables one to discern the mean for all the other virtues.

Virtues enable us to pursue a variety of public goods within a *community*—a concept that was especially important for citizens of ancient Greek city-states, since the city-state's survival depended on the close cooperation of its citizens. Taken together, the moral virtues also enable us to fulfill ourselves as human beings. They enable us to attain happiness, by which Aristotle meant self-fulfillment through an active life in accordance with our reason (rather than a life of mere contentment or pleasure).

What exactly is the morally good judgment required in discerning the mean in particular circumstances? Aristotle tells us it arises from the development of good habits as achieved through proper training within families and communities. This answer, however, merely pushes the question a step backward: How do we identify proper training, and how do we ensure that it results in good judgment? Aristotle's appeal to good judgment conceals the specific moral requirements and ideals, much like an appeal to "reasonable person" in the law conceals a great complexity of legal rules. The ultimate reference, however, is to goods made possible within particular communities.

More recently, Alasdair MacIntyre applied Aristotle's themes, including his emphasis on community and public goods, to the professions.[23] MacIntyre conceives of professions as valuable social activities, which he calls *social practices*. A social practice is

> any coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended.[24]

There are three key ideas in this definition: internal goods, standards of excellence, and human progress ("extension"). *Internal goods* are good things (products, activities, experiences, etc.) that are so essential to a social practice that they partly define it. Some internal goods are *public goods*—benefits provided to the community. Thus, health is the internal good of medicine, and legal justice the internal good of law. The internal goods of engineering, abstractly stated, are safe and useful technological products—products that can be further specified with regard to each area of engineering.

Other internal goods are *personal goods* connected with meaningful work. As an illustration, MacIntyre says that portrait painters discover "the good of a certain kind of life . . . *as a painter*" through "participation in the attempts to sustain progress and to respond creatively to problems," and more generally in the pursuit of excellence as an artist.[25] Similarly, personal meaning in working *as an engineer* connects with personal commitments to create useful and safe public goods and services.

Social practices produce *external goods,* which are goods that can be earned through engaging in a variety of practices. External goods include money, power, self-esteem, and prestige. External goods are, of course, vitally important to individuals and to organizations, and, although MacIntyre does not say so, sometimes they also partly define practices. Thus, we could not understand professions as forms of work without mentioning the money they make possible. Nevertheless, excessive concern for external goods, whether by individuals or organizations, threatens internal goods (both public and personal goods). In extreme instances, they thoroughly corrupt institutions and undermine social practices, as when managers use corporate resources for private gain or when engineers become so demoralized that they fail to maintain standards of professionalism.

Standards of excellence enable internal goods to be achieved (consistent with other important values within democracies). In professions like engineering, these standards include technical guidelines that specify state-of-the-art quality. Most important, they also include the requirements stated in professional codes of ethics, which are incumbent on all members of a profession. The codes promote internal goods positively by encouraging engineers to commit themselves to codified standards of conduct. Codes are also used to impose penalties for dishonesty, destructive types of conflicts of interest, and other failures of professionalism.

The virtues enable engineers to meet standards of excellence and thereby achieve internal goods, especially public or community goods, without allowing external goods such as money and power to distract their public commitments. The virtues thereby add to the personal meaning that engineers find in their work by linking individual lives to wider communities. All four categories of the virtues play key roles in engineers' commitments to the safety, health, and welfare of the public. That is obviously true of the public-spirited, proficiency, and self-governance virtues, but it is equally true of the teamwork virtues required within the organizations that make possible contemporary technological development.

Finally, *progress* is made possible through social practices. Nowhere is this truer than in the professions, which systematically expand our understanding and achievement of public and private goods. Think how dramatically engineers have improved human life during the past century by developing the internal combustion engine, computers, the Internet, and a host of consumer products. In this way, engineering and other professions are embedded in wider circles of meaning, in particular within communities and traditions.

We conclude by noting two challenges to virtue ethics, or rather areas needing refinement. The first is that virtue ethicists often talk as if virtues are all or nothing. Indeed, Aristotle held that to have one cardinal virtue—wisdom, courage, temperance, and justice—implied having all the others. This doctrine of "the unity of the virtues" is now widely criticized. Just as rights can conflict with rights, duties with duties, and goods with goods, virtues can conflict or be in tension with each other.[26] For example, complete honesty with others is often in tension with being considerate and sensitive. The person who is ruthlessly candid is likely to say derogatory things about other people's dress, talents, or accomplishments.[27] Moreover, all of us have gaps in our character—stronger in some areas and weaker in others.[28] Hence, virtue ethics needs to avoid all-or-nothing claims about being virtuous.

The second problem is that virtue ethics seems incomplete and, when taken by itself, too vague. Critics of virtue ethics argue that the meaning and requirements of virtues need to be spelled out in terms of at least rough guidelines or rules, lest the virtues fail to provide adequate moral guidance.[29] For example, honesty requires certain kinds of actions, done from certain kinds of motives. It implies a disposition, among other things, not to tell lies (without special justification) because lying disrespects persons and otherwise causes harm.

DISCUSSION QUESTIONS

1. Apply Aristotle's idea of the Golden Mean in understanding these virtues of engineers: (a) loyalty to employers, (b) courage in serving the public. In each case, provide an illustration of excess (too much) and defect (too little). Do you find his idea of the Golden Mean illuminating, or does it provide insufficient guidance? Also, Aristotle acknowledged that some virtues have no excess, that is, the more the better. Is that true of the virtue of engineering competence?

2. Review the NSPE Code of Ethics. To what extent do its "Fundamental Canons" rely on the language of the virtues? Try rewriting the canons entirely in terms of the virtues, and comment on what is lost or gained in doing so.
3. In your own words, explain the key ideas in Alasdair MacIntyre's conception of social practices (as they apply to engineering) and Samuel Florman's credo. Discuss similarities and differences in their views, and what you find insightful and problematic in their views.
4. Wrongdoing by professionals is often due in part to pressures within their organizations, but character remains important in understanding why only some professionals succumb to those pressures and engage in wrongdoing. Return to LeMessurier in the Citicorp case in chapter 1 and discuss what kinds of character faults might tempt other engineers in his situation to simply ignore the problem. The faults might be general ones in an individual or those limited to the situation. Consider each of the following categories: (a) moral indifference and negligence, (b) intentional (knowing) wrongdoing, (c) professional incompetence, (d) bias or lack of objectivity, (e) fear, (f) lack of effort, (g) lack of imagination or perspective.
5. We defined virtues as desirable and undesirable habits of conduct, motive, attitude, etc. By extension, we also speak of the character of organizations, that is, the patterns of virtues and vices that are manifested by management, employees, and corporate policies. For example, what is meant when we call a company honest or fair? And which vices were manifested by Enron, as discussed in chapter 1? Or Ford, with regard to safety?
6. Self-respect is an essential virtue in engineering, as elsewhere. What is self-respect? Is it the same as self-esteem, which is an idea popularized in the self-esteem movement in education and in teaching values in recent decades?[30]

3.4 SELF-REALIZATION AND SELF-INTEREST

Each of the preceding ethical theories leaves considerable room for self-interest, that is, for pursuing what is good for oneself. Utilitarians believe that self-interest should enter into our calculations of the overall good; rights ethics says we have rights to pursue our legitimate interests; duty ethics says we have duties to ourselves; and virtue ethics links our personal good with participating in communities and social practices. Self-realization ethics, however, gives greater prominence to self-interest and to personal commitments that individuals develop.

As with the other ethical theories, we will consider two versions, this time depending on how the self (the person) is conceived. In one version, called ethical egoism, the self is conceived in a highly individualistic manner. In a second version, the self to be realized is understood in terms of caring relationships and communities.

3.4.1 Ethical Egoism

Ethical egoism says that each of us ought always and only to promote our own self-interest. The theory is *ethical* because it is a theory about morality, and it is *egoistic* because it says the sole duty of each of us is to maximize our well-being. Self-interest is understood as our long-term and enlightened well-being (good, happiness), rather than a narrow, short-sighted pursuit of immediate pleasures

that leaves us frustrated or damaged in the long run. Thus, Thomas Hobbes (1588–1679) and Ayn Rand (1905–1982) recommend a "rational" concern for one's long-term interests. Hobbes says that rational persons will agree to abide by a "social contract" in which one obeys the laws when others are willing to do so, thereby lifting them from a "state of nature" in which constant war makes life "solitary, poor, nasty, brutish, and short."[31] Rand celebrates a host of virtues exercised on behalf of oneself: self-respect, honesty with oneself, courage and excellence in pursuing personal projects, and even respect for others insofar as it tends to promote one's endeavors.[32]

Nevertheless, these and other ethical egoists do not assume that well-being must involve community and caring for others. Indeed, ethical egoists deny the value of altruism, of caring about others for their sake. Their ethical standard is that each of us should care about our self-interest—period. As such, ethical egoism sounds like an endorsement of selfishness. It implies that engineers should think first and last about what is beneficial to themselves, an implication at odds with the injunction to keep paramount the public health, safety, and welfare. As such, ethical egoism is an alarming view.

Are there any arguments to support ethical egoism? Rand offers three arguments. First, she emphasizes the importance of self-respect, and then portrays altruism toward others as incompatible with valuing oneself. She contends that acts of altruism are degrading, both to others and to oneself: "altruism permits no concept of a self-respecting, self-supporting man—a man who supports his life by his own effort and neither sacrifices himself nor others."[33] This argument contains one important premise: Independence is a value of great importance, especially in democratic and capitalistic economies. Yet independence is not the only important value. In infancy, advanced age, and various junctures in between, each of us is vulnerable. We are also interdependent, as much as independent. Self-respect includes recognition of our vulnerabilities and interdependencies, and certainly it is compatible with caring about other persons as well as about ourselves.

Rand's second argument is that the world would be a better place if all or most people embraced ethical egoism. Especially in her novels, Rand portrays heroic individuals who by pursuing their self-interest indirectly contribute to the good of others. She dramatizes Adam Smith's "invisible hand" argument, set forth in 1776 in *The Wealth of Nations*. According to Smith, in the marketplace individuals do and should seek their own economic interests, but in doing so it is as if each businessperson were "led by an invisible hand to promote an end which was no part of his intention."[34] To be sure, Smith had in mind the invisible hand of God, whereas Rand is an atheist, but both appeal to the general good for society of self-seeking in the professions and business. This argument, too, contains an enormously important truth (although it is doubtful that unrestrained capitalism always maximizes the general good). Nevertheless, contrary to Rand, this argument does not support ethical egoism. For notice that it assumes we ought to care about the well-being of others, for their sake—something denied by ethical egoism itself! And once the general good becomes the moral touchstone, we are actually dealing with a version of utilitarianism.