Professional Ethics: Taking the High Road

Every game has rules, and so does every profession. Some ethical principles are obvious to most mathematicians, but in certain cases, because of cultural differences or lack of experience, clarification can be useful. I'm certainly not an authority on the subject, but after the editor of this column read a discussion of ethics in a survival manual I wrote for graduate students [1], she asked me to lay out some of these issues for your consideration.

The discussion of each topic begins with a brief scenario, true except that information that could identify any individual has been changed.

Careers in the
Math Sciences

By Dianne P. O'Leary

Academic Integrity

Jason and Sylvia work together on their homework in a study group. Judy has found a website where she can hire someone to write a program for her class assignment. How much help can these students legitimately get?

The university system of education is built upon a high level of trust that students and faculty will be honest in their dealings with each other. It breaks down quickly when this honesty is lacking.

Here are some actions that violate the trust (along with definitions from the University of Maryland *Code of Academic Integrity* [2] and examples, some from the University of Maryland *Student Guide to Academic Integrity*):

■ **Cheating:** "intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise." It is cheating to use a solution set obtained by breaking into a professor's computer files, to use an unauthorized "crib sheet" on an exam, to have a friend do your homework, to look at another student's paper during an exam, etc.

■ **Fabrication:** "intentional and unauthorized falsification or invention of any information or citation." You fabricate if you enter false data in a log book, add unused references to a bibliography, change your answers before submitting a paper for regrading, etc.

■ **Plagiarism:** "intentionally representing the words or ideas of another as one's own." This includes copying homework from another student, claiming another person's idea as your own in a thesis, and quoting from someone's work without indicating that it is a quotation.

It is also a violation of integrity to help someone else in such actions. Examples include lending your homework paper to someone else, letting someone copy your answers in an exam, revealing exam questions to people preparing for the exam, and helping someone break into a colleague's computer files.

Such violations of trust are taken quite seriously at universities, and the consequences can include failing a course or expulsion. You should make yourself familiar with the code of integrity at your institution.

Intellectual Property

Jiaying is a young mathematician writing her first research paper. She needs an introduction that will explain what the problem is and why it is important. She finds the discussion in Dr. Bigshot's textbook very clear, and she cannot imagine how to improve on it. Can she use his explanation in her paper?

In some cultures it has been acceptable to take another person's work and present it as one's own. For instance, many masterpieces of Baroque music are built upon musical themes "borrowed" from other composers without explicit credit. In current Western culture, this is unacceptable plagiarism, whether it involves ideas, words, or, to a lesser extent, music. (It was particularly disheartening to discover that someone plagiarized a version of this ethics discussion from my website!)

Ideas and words represent creative effort and have intellectual value, and are thus covered by a well-defined system of property rights. Stealing words or ideas is theft, just as surely as stealing automobiles is, and sanctions can be quite serious. Here are some guidelines:

■ If you include a paragraph from someone else's written work in a work of your own, you must enclose it in quotation marks and give a citation. If you change some of the words but leave the writing essentially unchanged, you must put the unchanged pieces in quotation marks and list your source.

■ If a substantial part of your paper (say, a page or more) is taken from previous work, then you must have permission from the author and the publisher or copyright holder and give appropriate credit: "This section is taken directly from . . . ," or "This summary closely follows. . . ." This applies even if you are the author of the previous work.

■ You cannot publish work that is taken primarily from someone else's work; you must provide "added value" in the form of new ideas, new derivations, or new implementations. You must clearly distinguish between your work and that of others, and cite all relevant work.

Consequences of plagiarism can include failing a course, losing a job, being expelled from a university, or being banned from having any work published in a journal.

Patent rights must also be respected. If a device or idea is patented, you should not use it in your work unless you obtain the necessary permission.

If you have a reputation for failing to credit other researchers, you will have a hard time finding collaborators, and few people will be willing to write letters of recommendation for you.

Use of Computer Facilities

Dmitry is a research associate at a university. To supplement his salary, which is barely enough to live on, he has a business exporting used cars to Russia. Can he use his university e-mail account in his business? Can he keep his business records on the laptop that his adviser bought for him to use in his research?

Each institution has had to think very carefully about the ethics involved in the use of computer facilities, and most now have formal documents defining acceptable and unacceptable use. The issues to balance include free speech, communication of research without unnecessary obstacles, and responsible attention to the law.

Some activities are almost universally prohibited:

■ Hacking. This includes trying to access or alter computer hardware, software, files, or websites without permission.

■ Sending e-mail in another user's name or maliciously locking other users out of a shared resource.

■ Violating copyright or licensing agreements on software packages.

■ Using an institution's computers without permission to run an outside business operation.

■ Spamming. This means sending large volumes of e-mail, thereby disrupting communications for an entire set of users. The usual purpose is either harassment of an individual or widespread dissemination of "get-rich-quick" pyramid schemes.

■ Using computers for illegal activities, including pyramid schemes, making threats, theft, and child pornography.

Again, these are serious matters and are usually dealt with either by suspension of computer privileges, expulsion from a university, termination of a job, or legal charges. You should make yourself familiar with the code of computer use at your institution.

Human Relations

Jim has worked with Stacey, one of his graduate students, for two years, and he really likes her. He wants to invite her to a concert next weekend. Raj is a teaching assistant, and he wants to date Kathy, a student in his recitation section. Is it ethical for Jim and Raj to go ahead?

Steve's home computer is infected with a virus, and he knows that Ning, who is struggling in the analysis course he teaches, is an expert who would be able to fix it in a few hours of work. Should he ask her?

Professor Martin refuses to supervise any women graduate students, and Professor Jones won't work with Muslims.

The United States is not alone in its history of discrimination against large groups of people on the basis of race, religion, or other factors, and the legacy of such actions continues to be divisive in many countries. In an attempt to redress past wrongs and prevent future ones, the U.S. has built what may be the most complicated system of laws and regulations in existence, many of them contradictory to some extent. Rather than try to understand every fine point of the laws relevant to your situation (e.g., when are distinctions based on mental ability discriminatory?), it is perhaps easier to be guided by two basic principles that motivated such laws:

■ It is wrong to use authority to coerce favors. It is also unacceptable to *appear* to use your authority this way.

—Thus, you cannot ask students or employees to do personal errands for you, such as babysitting and shopping, as part of their duties.

—What requests are permissible? You can ask students to do work assigned to the class. You can ask teaching assistants to carry out duties associated with their assigned classes: grading, holding office hours, copying exams, etc. You can ask research assistants to perform duties associated with the research project: library work, programming, running experiments, writing reports, minor clerical work, etc.

—Any requests outside these boundaries must be made with an offer of compensation. A student asked to babysit or to work at a professor's party must be offered market-rate payment, and with the understanding that there is no penalty for saying "no." A student asked to work at a conference that a professor is organizing should benefit through a waived registration fee and the chance to network with experts in the field. If a researcher wants help in refereeing a paper, both the student (or employee) and the editor must freely consent.

—Supervisors cannot ask to be listed as authors of papers to which they made minimal contributions. The American Mathematical Society statement on authorship [3] is typical of professional standards:

"All the authors listed for a paper . . . must have made a significant contribution to its content, and all who have made such a contribution must be offered the opportunity to be listed as an author."

SIAM's Policy on Authorial Integrity [4] and the policy of *Science* [5] are also good references.

—Inappropriate use of authority is particularly difficult to sort through if the relationship is defined on multiple levels. It is dangerous to have a dating relationship with a student or employee while you have authority over that person. It can poison the atmosphere for the class or research group by giving the impression of favoritism. It can open you to charges of sexual harassment.

■ You must treat colleagues, supervisors, and students with respect. Even if you find it difficult to deal with their ethnic background, religion, etc., your actions or attitudes in response to these issues must not interfere with their work. You cannot use such personal issues as a basis for grading or promotion. You cannot harass anyone.

Again, these issues are covered by a tangle of laws. Before you run into trouble, talk to a trusted colleague and check the human relations policy at your institution.

Professional Integrity

Erika has discovered a bug in the software provided with a medical device that her company markets. Occasionally, the device will do something that endangers a patient, but no one has complained about it yet. The company is laying off workers, and Erika is worried that she could lose her job, especially if she is labeled a troublemaker for reporting a problem that could be expensive to correct. What should she do?

Professional integrity encompasses a wide variety of responsibilities. Here are a few of them:

■ You must be honest in your professional dealings, giving due credit for other people's ideas and not claiming credit for work that you have not done.

■ You must treat professional colleagues and students with respect.

■ An old labor rallying cry says, "A full day's work for a full day's pay." Every job has its pleasant and unpleasant aspects. (For me, the worst part of professional life is dealing with academic dishonesty.) But in accepting a job, you agree to perform all of its duties, not just the pleasant ones.

■ You cannot use an institution's resources (computers, copying machines, postage, etc.) for anything other than official purposes without permission.

■ The confidentiality of knowledge obtained through professional activities must be respected. For instance, you must safeguard students' grades, the contents of private databases, papers you referee, and trade secrets.

■ The physician's motto—"First, do no harm"—is also relevant to our profession. This means that any product or idea you deliver must be as correct as you can make it, with no known but unannounced defects. Your mathematical model may be used to determine load limits on a building or safeguards on a nuclear stockpile. Your computer program may be used as a module in a hospital's drug delivery system, or as part of a guidance system in a passenger aircraft. You must do everything you can to ensure that your work, if used as you say it can be, will perform as intended.

Additional viewpoints on these issues can be found in the AMS Code of Ethics [3], the ACM Code of Ethics [6], and similar documents from other professional societies.

Values

"Some people live to work; others work to live." Whether your job is the greatest joy in your life or just a duty, it is worth reflecting on the broader impact of your work. Maybe your research won't win a Fields Medal, and maybe you will never be SIAM's John von Neumann Lecturer, but you can use some of your creative energy to see that your efforts have some positive value. When all is said and done, if you have encouraged an at-risk student, written a clear textbook, helped a staff member or a more junior colleague, or organized a conference that catalyzed new research, you have made contributions that could far outweigh your technical ones. Whatever your values, bring them to work.

Acknowledgments

References

[1] Chapter 13 of *Graduate Study in the Computer and Mathematical Sciences: A Survival Manual*; http://www.cs.umd.edu/users/oleary/gradstudy/gradstudy.html.
[2] http://www.president.umd.edu/policies/iii100a.html.
[3] http://www.ams.org/about-us/governance/policy-statements/sec-ethics.
[4] http://www.siam.org/journals/plagiarism.php.
[5] Bruce Alberts, *Promoting scientific standards*, Science, 327:5961 (2010), 12, http://www.sciencemag.org/content/327/5961/12.
[6] http://www.acm.org/about/code-of-ethics.

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