

Chapter 1

The Meaning of Life

Machiavelli's teaching would hardly have stood the test of Parliamentary government, for public discussion demands at least the profession of good faith.

Lord Acton (British literary figure)

A life which does not go into action is a failure.

Arnold J. Toynbee (historian)

I think one of the greatest joys I have now in my career and in my profession is to be playing at an age where I can appreciate it more than I used to ... It's a whole different lens you look through the older you get.

Andre Agassi (tennis player)

The profession had a profound saddening effect on my life.

Armand Assante (actor)

In England, the profession of the law is that which seems to hold out the strongest attraction to talent, from the circumstance, that in its ability, coupled with exertion, even though unaided by patronage, cannot fail of obtaining reward.

Charles Babbage (mathematician, scientist)

The ABC of our profession is to avoid these large abstract terms in order to try to discover behind them the only concrete realities, which are human beings.

Marc Bloch (historian)

1.1 What Am I Supposed to Be Doing Here?

And well might you ask. When I landed my first job—an Assistant Professorship at UCLA—I may as well have been placed as first trombone in the Milwaukee Symphony. I had no clue of who I was or where I was supposed to be or what I was supposed to do. Well, that is not quite true. I knew that I was a math professor and that I was supposed to teach classes and to prove theorems. But I had no detailed knowledge of what that really entailed.

Certainly the first thing you should do when you show up in your new department, assuming that you are in an academic job, is to go to the Chair's office and introduce yourself to people. This includes all the secretaries and the staff and, of course, the Chair or Head himself/herself. Be prepared to sit for a while and pass the time of day with the Chair—be sure that you have enough time to get acquainted! Discuss your duties, your goals, and your frame of mind as you join this new department. Ask the Chair whom you should meet, who will be the key people in your life.

You will also want to find out who is the Vice-Chair for Undergraduate Studies and the Vice-Chair for Graduate Studies and introduce yourself to those people. You may not have meaningful relationships with these folks for a while yet. But they are, or will be, significant players in your life. You want to know who they are, and you want them on your team. Spend a little time studying the entire composition of the department and its place in the university infrastructure. There may be a Coordinator of Lower Division Teaching, a Supervisor of Undergraduate Advising, a Graduate Student Mentor, and any number of other people whom you never dreamed of before.¹ They are all a part of your world now, and you would do well to get to know them all—at least to the extent of being able to say hello to them when you meet them in the hall.

An immediate need and responsibility for you is to find out who are the key people in your subject (i.e., research) area. Knock on their doors. Introduce yourself. Find out when the seminar meets and become an active and participating member. That means that you should volunteer to give talks, you should attend all the meetings, you should participate enthusiastically and meaningfully. If the analysts are all in the habit of going out for a beer

¹If you are in a small department, with just a handful of faculty, then the structure of the department will be much simpler. Certainly there will not be so many officers. You may find, in such a context, that you are inheriting responsibilities much faster than you expected. This matter will be discussed later in the book.

on Friday afternoons, and if you are an analyst, then you had best join in. If there is an intramural soccer team, then you probably ought to throw your hat in the ring.

Things will be different at different types of institutions. At a smaller college, the individual departments are somewhat small, and there is a good deal of interaction among the different departments. Mathematicians routinely have lunch with faculty from engineering or French or history, and they have friends in many different disciplines. Life at a comprehensive university will be somewhat like this as well. So if your new job is at a place like this, then you will start meeting a variety of faculty, with a variety of different backgrounds, early on. There may not be a seminar in your subject area—or even an active research group. But, if you are lucky, there may be a larger, research-oriented institution not far away (within a hundred-mile radius, let's say) where you could go for seminars and some mathematical talk.

The fact is that, at a teaching college or a comprehensive university, your focus is going to be a bit different. Now you are going to want to get to know everyone, because you will be interacting with everyone on a regular basis. Such departments are generally run rather democratically, and you want to make an effort to fit in from the get-go. It is quite common for a small department to have a multihour faculty meeting two or three times per week. This is where departmental business is dispatched and many decisions are made. It takes the place of a myriad of departmental officers and committees. So your job now is to figure out the system and become a part of it.

When I was at UCLA, all the movers and shakers in the math department participated in a monthly poker game. It was by invitation only, and I was never invited. But this was where many of the most important departmental decisions were made. It was the proverbial “smoke-filled room” where deals were made and broken. If you were part of it, then you were a “made man.” Otherwise not.

This is life. What appears on the surface of things, what is written in the university catalogue, what is written in the *Tenure Document*, is only the tip of the iceberg when it comes to understanding how the place really works and how the power structure really functions. It is essential that you develop a good, working relationship with a senior mentor—someone who can give you regular reality checks on how things are going in the department, and particularly *how you are doing* in the department. How can you find such a person and get to know him/her? More will be said about this matter as

the book develops. Certainly attending seminars, going to teas, attending social events, and cultivating mathematical conversations are obvious ways to start. Some departments or organizations will actually *assign* you a senior mentor the day that you walk in the door. In my own department we found that this didn't work very well because it was a bit artificial. Most times you will have to identify and develop a relationship with such a person yourself.

1.2 Getting to Know You

I have already said that you must get to know people. If you land at your new job and just hide in your office, then your future will not be bright. You may be chuckling in your beard, but in fact it's all too easy in an academic job to just teach your calculus classes and then go home. That is a sure recipe for failure.

You really want to become a fixture around the department. You want the staff to like you and to think of you as someone that they can depend on. You want the senior faculty to look forward to seeing you each day, to look forward to hearing about your (mathematical) results. When a senior faculty member goes to another school to give a colloquium, or goes to a conference, he/she should be saying to his/her friends, "We've got this terrific new young guy/gal in our department. He/she is a real plus to our program, and a gifted young mathematician. We were lucky to hire him/her."

If you are at an institution where teaching is the major emphasis, then perhaps you will establish your bona fides in the department in a slightly different fashion. Become a knockout calculus teacher. Come up with innovative ways to get your students involved in the subject matter. Hold special problem sessions. Create special software for your course. The main point is to find a way to make your presence known. You want everyone to know who you are and what you have to contribute.

I don't mean to downplay your potential relationship with other junior faculty or junior staff. These are really your comrades-in-arms, and you want to get to know them too. Certainly don't think of yourselves as competitors for some mutually exclusive holy grail. It's not as though if Bob gets tenure then the slot is gone so you will be denied tenure. *Usually* tenure is a zero-one game that you play against yourself. That is, if you make the grade, you get tenure, and if you don't make the grade, you don't. It happens only very occasionally (contrary to what you may see in a Hollywood movie) that a

department will be told that for budgetary reasons it can only tenure one person this year—even though it has three good candidates who are ready for tenure.

These days there are some very useful and active organizations that help young mathematicians and, more generally, young scholars get oriented in their new professional lives. One of these is the Young Mathematicians' Network (YMN).² Located at <http://concerns.youngmath.net/>, this is an organization founded by a group of young mathematicians who wanted to create a resource for people looking for jobs, people trying to get settled in a new department, people trying to get tenure. Going to the Website, you will see that YMN sponsors conferences, hosts Websites and discussion groups, and mentors activities around the country. Most of the founders of this enterprise now have tenure in some good departments around the country, and the torch has been passed to a new generation. But the activity continues, and it is certainly valuable and worthwhile. In fact it has spawned the book [BEC], and this is a fine resource for the beginning mathematician.

Another excellent touchstone for the beginning mathematician, or more generally the beginning scholar, is Project NExT (New Experiences in Teaching), sponsored by the ExxonMobil Foundation and a number of other companies and organizations. Project NExT is overseen and administered by the Mathematical Association of America. This is a loose-knit organization of junior faculty across the country who want to share common interests and concerns. They are mentored by a broad cross-section of senior mathematicians who make themselves available for consultation or for just chewing the rag. The Project NExT people have their main meeting each year at the Summer MathFest (sponsored by the MAA); then they reconvene at a smaller event at the January AMS/MAA meetings. They also organize other special events. Project NExT endeavors to inform its members about publishing, about tenure, about teaching, and about getting along in a math department.³ It has done a lot of good for a lot of people, and I encourage you to get involved—the Website is <http://archives.math.utk.edu/projnext/>.

²This group has also become known as “Concerns of Young Mathematicians” (CYM).

³The young mathematician's home department is required to be a part of Project NExT. In particular, it is the home department that pays for travel to the NExT meetings.

1.3 Getting to Know Your Teaching

Teaching is exciting and rewarding and can also be fun. Interacting with bright young people is certainly one of the finer things in life. Explaining important ideas to a receptive audience is fulfilling, and is also important for bringing a new generation of young adults up to speed in our discipline. You are fortunate to be part of a vocation that puts you front and center in this process. Make the most of it.

What does this mean? First of all, you will get a whole lot more out of your teaching—and everyone else will too—if you are reasonably good at it. The ability to teach well is *not* something you are just born with—like the ability to hear with perfect pitch. It is a cultivated skill, and one that you should start working on right away—see Section 2.1. Some of the traits of a good teacher are simply matters of tending to business: You prepare your lectures carefully, you write a good syllabus, you choose an appropriate and readable text. Other traits are special and personal and will require hard work.

You will probably have had some experience as a teaching assistant, or TA, and that is an activity that resembles teaching. But *really teaching*—being in charge of a class, writing the exams, assigning the grades, handling the problem situations—is a rather more sophisticated activity.

I may humbly suggest that you consult the book [KRA1], which will give you the full story on almost every aspect of teaching, and more particularly of teaching mathematics. God is in the details, and you will find that the enterprise of teaching is certainly a whole that is greater than the sum of its parts. *Preparation* is a big part of being an effective teacher. You want to convey the immediate and powerful impression that you are a professional who is on top of the material and who knows how to communicate it. Many of your other shortcomings will be forgiven, or at least overlooked, if it is clear that you are a pro who is doing his/her best to do a top-notch job. You want to be courteous, kind, and fair. I have always gotten along well with my classes and garnered reasonably good teaching evaluations,⁴ but in recent years I have done even better than usual because students warm up to the fact that I am so easygoing. I think this means that when they come to me with a problem—a forgotten assignment, or an overslept exam, or a

⁴There are a few exceptions, such as the teaching evaluation that said that I should not be allowed to teach any biped in any state west of the Mississippi.

plane ticket that conflicts with the final, or some other completely irrational, unjustifiable quagmire of a situation—I always say, “OK, we can probably handle that. Let’s sit down and work something out.” I have found over the years that such an attitude requires no more effort, and is no more of a strain, than chewing the student out, or trying to create more trouble for everyone.

There are particular skills to writing a good exam, to grading the exams fairly, to determining course grades, and so forth. It requires some genuine insight to assess a class, determine the students’ level and preparation, and then pitch the lessons so that the students will understand them and benefit from them. Again, these matters are addressed in some detail in [KRA1]. Good teaching is a skill that you will hone over a period of years, just like a good golf game or a good attack on the cello. Talking to colleagues, both your senior mentors and your peer junior faculty, is an extremely valuable exercise. It is always useful to bounce your ideas off of others with a similar set of experiences. Sometimes you can do a thought experiment with your friends and thereby avoid a cataclysm in the classroom.

Whether you hang your hat in a research department or a teaching department or (like my own) a department that is a mixture of both, you will do well to have a positive teaching reputation. You will thereby have the respect and admiration of your students and colleagues, and a definite plus in your portfolio. It is unlikely that you will get tenure just on the basis of your teaching alone, but teaching will certainly play a key role in the decision. Indeed, in most math departments today, if you are a top-notch researcher but a distinctly lousy teacher, then you will almost certainly not get tenure.

1.4 Getting to Know the Other Aspects of Your Life

I shall say repeatedly in this book that the three big vectors in an academic life are

- teaching
- research
- service

Of course one of the main messages of the book is that there really is a lot more to it than that simple list. But those three are milestones, and I shall say a great deal in the ensuing pages about them.

Service is in some sense the easy part of your life, because you don't even have to think about it. It will be thrust upon you. That is to say, you will live your ordinary life in the math department, and you will be assigned certain committee or task force duties. And you will do them—presumably responsibly and effectively. For most of us, that is the extent of service. You can be asked to serve on university-wide committees, and you should do so with your usual aplomb and professionalism. You might be tapped to be Vice-Chair for Undergraduate Studies or Vice-Chair for Graduate Studies or even Chair (i.e., Chairperson or Head of the department). To these you should not give a knee-jerk “yes” answer, because any of these is a big commitment. On the one hand, you feel an obligation to serve your colleagues and your institution. On the other hand you have a life to live. You may have a spouse or significant other, and a family, and perhaps a church or other religious affiliation. You need to balance all the components of your life. Subsequent sections of this book will discuss the various aspects of these different types of service and what they entail.

Perhaps the most difficult—and also the most rewarding—of the three components indicated above is research. It is difficult because most likely nobody has told you how to build your own research career, how to forge a path in the research world, how to establish a research identity. To get to the nitty gritty, *how do you find problems that are worth working on and how do you solve them and how do you write them up and how do you get them published?* This is the essential question to answer if you want to establish a scholarly reputation and get tenure in a good department. All of Chapter 4 is devoted to different aspects of the research life and how to cope with them.

This book tries to paint your life as a tapestry with many warps and wefts. You need to get along with many different types of people and you need to master many different kinds of tasks. And do so gracefully and with skill. If you can make this happen, then you will lead a rewarding and productive life, and you can write your own version of this book for the next generation.

1.5 Collegiality

In the 1950s, 1960s, and even most of the 1970s, math departments were extraordinarily friendly places. Salaries were low, duties were many, but the attitude was “we’re all in this together”. The lovely book [DAVH] captures the spirit of the camaraderie of the time.

It was very common in those days for there to be a colloquium each week, followed by a fairly large and high-spirited colloquium dinner, followed by a party at someone’s house. When I was an Assistant Professor at UCLA we had all these features, often followed by a swim in Richard Arens’s pool.

In fact I can recall many a time when, after lunch, one of the guys (and this time I really do mean a *guy*) would phone home and say, “Hello, dear. Joe Schlomokin from Purdue is in town. He’s giving a talk. Nobody else is giving the party, so I thought we could do it. Could you run to the store and pick up some stuff? Also he needs a place to flop and I told him he could sleep on our sofa. We’ll be going to dinner, and we’ll show up for the party at 8:00 p.m.” Miraculously, the spouse would reply with suitable enthusiasm, and the festivities would begin in due course.

Times have changed. Today most spouses work. Many spouses work as academics, and often in the same department as the other spouse. So there are a lot of shared responsibilities: child rearing, cooking, soccer game coaching, and on and on. This means that attendance at colloquium dinners is much thinner. This also means that there is nobody to phone up and tell to go out and pick up stuff for an impromptu party. And so forth. There are very few colloquium parties anymore—except for very distinguished or special guests.

In fact two-career couples often make imaginative accommodations to the issues raised in the preceding paragraph. For one thing, planning ahead for parties is much more common. Having cross-disciplinary parties—to honor someone from English at the same time as someone from math—is a new and often pleasing development. Obviously *both* members of the couple must pitch in for all aspects of the party, or for any other entertaining (dinners, outings, picnics, etc.) that is done. And certainly accommodations must be made for the kids, the pets, or perhaps an aging parent who has become part of the household.

Collegiality takes on new meaning, and has new practical significance, when a two-career couple with kids is trying to play the game. It is still of utmost importance to be collegial, to be friends with your colleagues, to

have a proactive and trusting relationship with the people in your workplace. This certainly will involve activities other than actually working (much of the work that a mathematician does is, after all, solitary). But you will actually have to work at being collegial.

Also the discipline has become more competitive. In the old days nobody was paid very well, and almost everyone with a body temperature above 93° had an NSF research grant. Today salaries are all over the map—and everyone knows it—and NSF grants are about as hard to get as vintage Elvis Presley records. Often the department colloquium has disintegrated into a number of competing seminars.

I don't mean to paint a bleak picture. Math departments can still be friendly places—fun to work in and intellectually stimulating. But they are different from what they were in years past.

In the late 1970s at UCLA there was a very special logic seminar called the Cabal Seminar. One might wonder about the provenance of this unusual name. Certainly it suggests something dark and mysterious for the cognoscenti. It turns out that the seminar was named in honor of the organizers' favorite real estate agent. Whenever they used her services to help a new mathematician relocate, she would give them a kickback from her commission. And they used the money to run the seminar.

The pleasures derived from this largesse were quite evident. On Fridays, when the rest of us were at tea eating Ritz crackers and drinking tepid tea, the logicians would be sitting off in the corner quaffing chilled wine and eating Camembert and *pâté de foie gras*. And they were able to bring in a number of classy speakers for their mathematical activities.

This is just the reality of life. There was nothing unfriendly about what the logicians were doing. But those who have enjoy and those who don't have don't.

It is important to do what you can to contribute to the collegiality of your Department. Go to lunch with colleagues. Participate in Ping-Pong games or intramural sports. Go out with friends for a beer after work. Get together on weekends for barbecues or picnics. Give as many parties as you (and your partner) feel comfortable giving. Working with people whom you like and trust, and with whom you feel comfortable, is a commodity that you just cannot buy. It can really smooth things out in your professional life.

1.6 What Else Is There to Life?

Well, more than you ever imagined. I have been a Professor now for thirty-four years, and my mother still thinks that all I do is teach. When I tell her that my teaching load is typically two courses per term, she wonders what I do with the rest of my time. I am tempted to say that I coach the football team.

An academic mathematician is *not* a high school teacher. While teaching is a *very important* part of what you do, it is by no means the only thing. Measured by the number of hours you will put into it, teaching is well less than half of what you do.

The rest of what you do is **(i)** research, **(ii)** exposition, **(iii)** departmental administrative activities, **(iv)** University administrative activities, **(v)** service to the profession. In item **(iii)** I am including, of course, serving on committees and running programs, but also activities that relate to teaching, such as undergraduate advising. Which is important if you care about math majors and the program overall. In item **(v)** I include editing of journals, refereeing, service on national committees, attending national meetings such as the January joint meeting of the AMS/MAA. In item **(iv)** I include anything that the Dean or the Provost or even your Chair may ask you to do. In item **(ii)** I include survey articles, book reviews, textbook writing, and any of the other myriad writing activities that one may take on in this line of work.

The life of an academic mathematician is rich and complex. You should read this entire book to get a palpable feeling for all its many dimensions. You must try to keep all the different components in perspective, and make some decisions about how to apportion your time. If you give all your time to teaching, then you will not be able to develop your research profile. If you give all your time to research, then your other activities will suffer. You want to be passionate about all the different aspects of your life, and you also want to give each its due.