1. In the classroom

While a young undergraduate, I once had a professor memorably (and perhaps a touch cynically) explain: "A 'good' math problem is a balancing act—it should be easy enough that you solve it, but hard enough that you feel smart when you're done." I don't completely agree with the statement, having seen professionally how motivating classical unsolved problems can be, but a modification of it is a central tenant of my teaching:

> A good math class is a balancing act—it should be inclusive and approachable, but simultaneously challenging in a way that gives students a chance to appreciate the beauty of our (and perhaps one day their) discipline.

Interacting with students, watching and listening to how they react in the classroom and through homework, I continue to learn how better to create that balance, varying my approach depending on the class as well as the student.

A central goal in every class I teach is sharing the beauty of mathematics with my students. For beginning classes, this has meant everything from informal discussions motivating why an integral is "the opposite" of a derivative, to discussing applications like Google page rank in a linear algebra course, to bringing up the occasional challenge problem. In both beginning and more advanced classes, I find that most students (like my professor once suggested) find beauty in those "aha!" moments, when they have struggled with a challenging concept and come out victorious, so I work hard to create an appropriately challenging environment. In a recent Combinatorics course I taught, for example, my homework assignments were a mixture of introductory and computational problems (to check for basic understanding) and a number of problems difficult enough to bring students to my office hours in droves, where with my encouragement they frequently worked as a group until they were successful. Despite the time commitment this required from my students, feedback (in person and through course reviews) from the students was incredibly positive...a tribute, in my opinion, to the fact that the course was challenging, without being overwhelming.

Supporting my students as I challenge them is an important part of my role as a teacher, whether this means encouraging group work, helping in office hours, or giving thoughtful examples in class. A good illustration comes from a young veteran in a recent calculus class who hadn't had a math class in six years; in office hours we identified key skills he was missing and several meetings later, he was finally starting to catch up with his peers. In the classroom, I find an important form of support comes from concrete examples and computations. It's impossible to get a student excited about integration by parts, if they don't first understand how to integrate and second, understand that certain situations require a rule that "undoes" the product rule, so I'm happy to present the rule after asking students to compute $\int xe^x dx$ and letting them feel confused for a moment.

Along the same lines, I work hard to understand and adapt to the background of my students and try to keep in mind my student's goals for the class. I teach differently to a room full of engineering students (covering more concrete examples and less δ, ϵ proofs for example) than in a class full of math majors, where proof technique might be a similarly important concept. I spend at least equal time making sure I understand my students' technical background. An example that combines both of these: because a significant portion of my students had not had a proof course before Combinatorics and because I believed basic proof writing technique is an incredibly important skill, every day a new student wrote a fully completed solution to a specially assigned problem on the blackboard before class. At the start of class, we critiqued not just the solution, but more importantly the write up. As the semester progressed and students needed less discussion of how to write a proof, the problems got more challenging, keeping students engaged.

My single most important tool for finding a balance in the classroom is to get continuous feedback from my students. Assessing their understanding with homework and exams is only a small part of this process. In class, I'm constantly asking questions of my students, deliberately pausing to wait for their reply, and encouraging them to interrupt with comments or questions. It is important to

me that I'm approachable; the reward comes when more than just one or two students speak up in class, and I get information on how a larger group of students is understanding. Although I like the feedback, it is also an important part of keeping students engaged in the material.

Finally, I'll add that I'm proud that not just my students learn in my classroom, and humbly understand that as a young instructor, I will continue to make (and hopefully learn from) mistakes. In teaching my first proof based class, as an example, I learned to split complicated proofs into "claims" that were easier to digest. In another instance, a student suggested that explanations would be clearer with more pictures, and I was happy to find he was right. I'm sure that my goals in the classroom as well as my techniques will continue to evolve, and I'll be gratified to evolve as an instructor as they do.

2. Outside the Classroom

As important as work in the classroom can be, I find it to be one small portion of "teaching." Mentoring students (first undergraduate, now some graduate as well) is one of the most pleasurable parts of my work. As one example, as a postdoc, I'm currently working on a project with a graduate student whose advisor was absent for a time. In another example, a student at Stanford had found a thesis problem (but not a thesis advisor) in my area of study. As a result I had the rewarding opportunity to take a more active roll on his thesis committee, helping him to revise his thesis. I'm optimistic that because I work in an area (algebraic combinatorics) with a low initial barrier to entry, but a lot of thrilling complexity just beneath the surface, that it will be a beautiful area in which to continue to mentor students in the future. As problems have to be selected carefully in Catalan combinatorics (with easy sounding problems becoming famous unsolved problems) I try to keep a modest list of problems I think are more approachable.

Organizing conferences (the Bay Area Discrete Math Day for graduate students and UCSD's Undergraduate Math Day for younger students), speaking at local seminars, and helping organize panels for undergraduates or graduate students that discuss graduate school or job applications are all other ways in which I have helped younger students on their journey through mathematics. I hope to become a similarly active and approachable faculty member, wherever my career takes me.