

Teaching mathematics is both important and enjoyable. It is necessary both for the flourishing of mathematics itself and because mathematics and mathematical thinking play an important role in many of the future paths students may envision for themselves. In my teaching efforts, I strive to be as helpful as I can to my students, to share with them the beauty of what they are learning, and to keep them feeling comfortable and encouraged on their academic journeys. In this statement, I summarize some aspects of my teaching style/philosophy that aid these goals as well as some of my past teaching experiences.

1. ASPECTS OF MY TEACHING STYLE

1.1. Active Learning. I like to keep my students actively engaged with the material through problem solving and collaboration, either in small groups of students or, when there are only a few students present, through a single dialogue involving everyone working together. In the latter case, I offer guiding questions and suggestions to the students, but try to leave enough room for the moment of discovery/realization to occur within instead of being dictated to them. I find that students retain techniques and ideas better when they can be guided towards them instead of simply told them. This situation, which everyone working together on a series of questions, most commonly arises in my office hours.

In my recitations, where I have students work in small groups, I like to first give them all 5 – 10 minutes to get started problem before I ‘make the rounds’, so to speak. I then go to each group individually to check in on them and provide hints/suggestions as needed before letting them return to work. Of course, students can raise their hand to flag me down at any point if they have a more immediate question, but I know not all students easily think to do this when they are stuck, so I find that actively checking in with each group ensures that I get some interaction with all students and lowers the barrier to asking questions. After finishing my rounds, I soon after begin a second round to followup with each group and see if new confusions arose.

Furthermore, I like to begin my recitations with a quick summary of the main new tool or idea that came up in lecture. I aim to keep these summaries only 5 minutes long with enough material to fill up one section of a blackboard. I feel this is enough space and time to impart something useful, but not so much that it significantly reduces the amount of problem solving time my students have. After my first round of checking in on student groups, if I notice common confusions, then I usually get the whole class’s attention to work through these confusions together with an example or two.

1.2. Fostering an Encouraging and Welcoming Environment. I find it is of utmost importance to foster a welcoming environment for my students. I try to always be kind and supportive, to greet them as they enter the classroom, and to generally maintain a friendly, non-intimidating demeanor. I encourage my students to ask questions and to offer suggestions. When their suggestions are not quite correct, I focus on aspects of them which are along the right lines, tell the student they are close to the answer, and encourage them to make adjustments (“That is a good suggestion, but I think it doesn’t quite fully resolve things because of ..., but you have the right idea. If we try adjusting this part, do you or anyone else see a tweak we could try?”). When I feel that I gave an inadequate answer to a student’s question in the moment, I let them know this is the case and that I will follow up with a better explanation. This often takes the form writing up a latex document with a nice explanation to send to them, posting an announcement on Canvas addressing the confusion, and/or giving a blackboard explanation to the class during the next session.

In my classrooms, I am not shy about sharing my own mistakes and struggles. I think it is important to remind students that mathematicians are humans, not perfect logical machines, so it is both normal and expected to be confused by some of the material and to make mistakes when working out examples. I both try to anticipate common mistakes so I can let students know to watch out for them and to tell stories

of my past mathematical experiences. For example, I usually tell one story about a time in undergrad when a friend and I both multiplied the same two 2×2 matrices on the blackboard, only to step back and realize that every single entry of our two answers were different and then to realize that mine were all wrong. I feel stories like this helps students internalize that mistakes and struggles are perfectly normal and that they can be overcome.

Finally, I like to ask my students for feedback on my teaching. I often ask them to let me know if there are things they feel I could be doing better and how they feel about the course overall. I most often about this in the minutes before class starts, when only a few students have made it in so far. When leading recitation for 18.06, I also asked my students to fill out a survey on my performance midway through the course. If they seem discouraged by their recent performance on a test, pset, or anything else, I remind them of extra resources they have outside of normal class time (e.g. office hours, emailing me directly, piazza), remind them that they are already comfortable with more of the material now than when the class started and will be comfortable with even more of it in the coming weeks, and generally try to help them see that their performance is not an innate reflection of them, but is something which can be improved with more instruction. I feel that these reminders can help students improve their mathematical self-image in the short term and make them feel more comfortable/willing to come to office hours or reach out in other ways in the long term.

2. TEACHING EXPERIENCE

2.1. Traditional Classrooms. In the fall of 2023, I served as a teaching assistant (TA) for MIT's *18.06 (Linear Algebra)*. I taught two hour-long recitations and held two hour-long office hours each week, as well as proctored and graded exams. I was allowed to structure my recitations and office hours as I saw fit. Accordingly, as previously mentioned, they both heavily featured active learning with me there to review core concepts, address common confusions, and guide students in their problem-solving practice.

Previously, as an undergraduate, I was a TA and residential counsellor for some summer academic [Stanford University Mathematics Camp](#), a TA for [Euler Circle](#) (a Bay Area-based math circle), a grader for Stanford's *Math 62DM* (Modern Mathematics: Discrete Methods), and a tutor for Stanford's *Math 122* (Modules and Group Representations). In these roles, I was able to work closely with students and develop the habits of encouraging, relating to, and soliciting feedback from students that I have used in my more recent teaching experiences.

2.2. Online Courses. I have also had the privilege of aiding in a couple online courses during my time as a graduate school. In the summer of 2021, I served as a teaching assistant (TA) for the [undergraduate session of the Park City Math Institute](#) (PCMI), and in the Fall of 2022, I served as a TA for the [Preliminary Arizona Winter School](#) (PAWS). Both of these positions were for online courses serving a large, varied collection of undergraduates (and some grad students in the case of PAWS). In both, I was able to lead discussions, answer questions, and generally be helpful/supportive to students of many different levels and backgrounds. I am still occasionally able to assist with PAWS and the broader, in-person [Arizona Winter School](#) (AWS). Last year, I served as one of the study group leaders for AWS and this October I was part of a PAWS panel about navigating grad school.

The lectures for PAWS were prerecorded by the head instructor, and I held office hours/problem sessions weekly over zoom. During these office hours, I would ask students how the class was going and go over the problem set with them. The problem sets were written each week by my fellow TAs and I. In addition, I maintained an overleaf document for my section of students where I could keep a record of some of our discussions and where they could contribute their own remarks and problem solutions. Finally, there was

a Zulip for hosting conversations between all the PAWS participants, including a channel specific to my office hours where I first introduced myself to my students and frequently posted updates and reminders.

During PCMI, the head instructors would lecture in real time over zoom and there was a discord for hosting communications amongst all the participants. In addition, we used [Sococo](#) to host virtual spaces for the course (and other aspects of the broader PCMI program). During the three week course, every day (except Wednesdays), we would host TA sessions for 1.5 hours where students could show up to our virtual offices in Sococo to chat and ask questions. In addition to these, I often held separate, hour-long office hours since it was difficult to schedule the usual TA sessions at times that were convenient for all of our students time zones.

2.3. Individual Mentorship. Every year in grad school, I have served as a mentor for MIT’s [directed reading program](#) (DRP). In this time, I have supervised 5 students as they learned 5 different topics, ranging from ‘an introduction to p -adic numbers’ to ‘Riemann surfaces and complex algebraic geometry’. I have also been happy to see some of these students go on to take up some tutoring/mentorship roles of their own. In each case, I would meet with each mentee for an hour or two 3 times a week to discuss their progress, answer questions, and offer general advice. Additionally, I am currently serving as a [GUMMI \(Grad–Undergrad Math Mentoring Initiative\) Mentor](#) for one MIT undergrad.

3. STUDENT EVALUATIONS

3.1. From 18.06 (Linear Algebra), Fall 2023, MIT. Students were asked to rate various aspects of my teaching on a numerical scale from 1 – 7 as well as given the option to include general comments about me. A summary of my average numeric ratings can be found in [Table 1](#).

Aspect	Stimulated interest	Displayed thorough knowledge of subject material	Helped me learn
Average Rating	7	7	7
Aspect	Presentations were well organized	Instructor encouraged participation	Instructor used good examples
Average Rating	6.4	6.4	6.4

TABLE 1. The average numeric ratings I received. 4 students responded to the questions in the first pair of rows, while 5 responded to those in the second.

The comments I received were:

- “Was very helpful both in and out of recitation/office hours. Gave good examples to help me understand concepts I had trouble on”
- “Top tier teacher. Could teach me anything”

3.2. From PAWS 2022 (Heights in Diophantine geometry), Fall 2022, Online. The students were asked to fill out a survey about their overall experience at the end of the course, allowing for general comments on the lecture/instruction quality at the end. 110 students responded in total, and a few of the students mentioned me by name in their comments:

- “Niven was excellent! He was always super prepared, which helped a lot.”
- “Our problem session leader Niven was very thoughtful and tried to find the best possible way for PSs to go. We were slow the first couple of weeks, so we could not get to the hard questions but it got better through the end.”
- “Niven was a great TA, but not many of my peers attended the problem session, so it felt very lacking.”