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Teaching Statement

I am interested in teaching because I enjoy interacting with students and peers in an academic environment. Teaching affords me the opportunity to expand my own knowledge base working alongside my peers and to pass on the knowledge I have accumulated from those who taught me. As an undergraduate, I worked as a mathematics tutor and I found this work to be very rewarding. It not only allowed me to keep my own skills sharp, but helped me to understand how others learn. Later, as a teaching assistant, I was presented with a new challenge: trying to teach to many different types of students all at once, and in such a way that they all would be able to understand. Everyone has a different way that they learn, whether it be by viewing the material once and comprehending it, by practice, or by application. Being able to present material in a way so as to reach as many of the students as possible is a goal that any teacher would hope to achieve.

I am capable of teaching numerical analysis, differential equation, and scientific programming courses. My background is in applied mathematics and my thesis focuses on efficient numerical schemes for high-order coupled nonlinear partial differential equations. My programming experience covers C++, MATLAB, and R with some use of FORTRAN.

Teaching Philosophy

I believe that learning is a three-step process: initially obtaining the information, processing it through trial and error, and eventually demonstrating mastery of it. In-class lectures facilitate the first step of being introduced to the information. The assigning of homework and independent study, including conversations with the professor and their peers, refines the students' knowledge. Finally, mastery is demonstrated in taking exams. I think that most students are proficient at the first step, if merely by attending lectures and taking notes. The second step is the one where many students falter. While the students may go through the trial process of solving problems, rarely do they take their errors, critically examine them, and try again. This iterative process of refining their knowledge and understanding is instrumental in working toward mastery. Many times, students give up after the first or second attempt because either they doubt their ability to solve the problem if the solution is not immediately available or the reward for completing the problem, especially difficult ones, is not worth the cost in terms of time and effort. Creating an environment where experimentation is encouraged is important in the learning process. In order to solve problems that may not be standard, one must be able to generate several different approaches, sort through them in an effective manner, and try to implement the most promising ones. While this, in the end, may not produce the desired result, the process of it is useful in developing effective problems solving skills.

I try to teach in a way that conveys information to the students and at the same time inspires independent thought. Giving the students the skills to take problems, evaluate them, and find practical solutions is important, not only in the classroom but in life. When students come up with novel approaches to problems, even if the approach is less efficient than the ones they are currently learning, I will discuss it with them, both in terms of benefits and drawbacks. I try to stress that most problems have multiple approaches that can all lead to the same place. The methods taught

for problem solving in class, or presented in the textbook, may be the most widely used, but students may find different approaches to be initially more palatable or easier to comprehend. Starting with the approach they do understand, it may be easier to transition them to comprehending the other methods.

I think the part of learning that is most pivotal is the trial and error process. To facilitate this, creating an environment where students are encouraged to consult not only with me but with their peers is paramount. As an undergraduate, I had a mathematics professor that had a novel way of doing this. He would make it an assignment at the beginning of the quarter to visit his office hours. The assignment was worth a nominal number of points, but it initiated teacher-student interaction outside of the classroom. This inspired high attendance at office hours to the point where most of the students attended and, rather than the professor dominating the office hour, the students would form groups and consult with the professor as needed. This let students see other viewpoints on the same problem and receive immediate feedback from the professor, expediting the trial and error process.

I have tried to create a similar experience for my students as a teaching assistant. Before exams, I would reserve a classroom for a review session. The sessions were informal and were open to any questions the students had about the material. Open discourse in an informal setting inspired the students to open up with their questions and ideas. I would stay as long as there were still students that had questions and I think it helped, as many mentioned that they appreciated it.

While I can do my best to inspire and encourage the students to work hard to learn and master the material, it is ultimately up to them to determine what they get out of the class. All I can do is try to create a learning environment for all of the students to put forth a good effort and ask questions if something is unclear. Inspiring students to apply themselves, even when the reward may not be immediately apparent, is a major goal that I would hope to achieve. Presenting the material in a way that is clear and concise, and setting goals beyond normal effort is important to the learning process. One must stress that putting in time studying and doing the homework, even though exams may be more heavily weighted, is what will lead to future success. The student should think in terms of working hard on accomplishing short-terms goals to the best of their ability and these small victories will strengthen their skills for larger goals, such as exams. The hope is that this work ethic will carry over into areas beyond the classroom.

The workload for students on a weekly basis should be manageable but also challenging. Providing the students with enough problems to practice the material is essential, but at a point their knowledge should be tested a bit more to see if they can apply it to more abstract problems or problems without a clear-cut way to solve them. Assigning homework of homogeneous difficulty places the onus on just completing the assignment and nothing more. Adding in more difficult problems forces the students to think about the material on a deeper level, sometimes needing to deconstruct and rebuild it to adapt it to another scenario. I think that exams should test mastery of the material. This should include testing the basic concepts of the course, but also push slightly beyond the rote to show how well the material is understood.

Writing lectures, I try to present the material in a manner that is easy to comprehend. For example, when presenting a theorem, I go through the proof in detail and explain each step and why it is taken. Following the presentation of a theorem, it is useful to present the applications so that the students can associate the theorem, which after seeing only once they may not fully understand, with how it can be used. This may also serve as a guide for them to learn which techniques will work with which problems.

Teaching Experience

During my time at UCLA, I have served as a teaching assistant for six courses: Math 3A,B (Calculus for Life Science Students), Math 32B (Calculus of Several Variables), Math 33A (Linear Algebra and Applications), Math 33B (Differential Equations), and Math 151A (Applied Numerical Methods). For the lower division courses, I was responsible for running discussion sections while the upper division course involved both discussion sections and the grading of homework.

As an undergraduate, I worked as both a tutor and grader in the mathematics department at California State University, Fullerton. My experience as a tutor consisted of working in the department tutoring center and privately. Grading for professors in the department was mostly for calculus and numerical analysis courses. My experience in tutoring helped me to better understand how students without a similar background to mine approached mathematics, since most were not math majors, and how to explain things in a way that would be easiest for them to comprehend. Many times, I was presented with questions from classes I had never taken, and so I had to quickly learn the material myself in order to try to help. I feel these situations not only refined my own skills as a mathematician but aided my teaching abilities, having to figure out the material myself and be able to turn around and explain it to someone else in a way they could understand easily. Grading for several years made me accustomed to the rigors of the work and helped me to identify which concepts in the course were causing students the most trouble. If many students were making the same mistake on a homework problem, I could relay this to the professor. Then the professor could correct this misunderstanding in a future lecture or in reviewing for the exam.

As a teaching assistant at UCLA, my approach for the discussion sections was to try to provide the students with useful tools for solving problems. Unless given specific instructions by the professor, I would typically review important concepts and demonstrate their applications by working on problems. I tried to show that many of the problems could be solved more than one way, which I found opened up the class to discussion of other approaches I may have not thought of and their feasibility. I would, at a few points throughout the course, see what the students wanted me to focus on, whether it be reviewing their previous day's lecture or working problems completely so they can better understand the process by which they are solved. For the numerical analysis course, I would sometimes write sample code or pseudo-code to help some of the students who did not have a strong computing background. Providing a starting point for the students typically made the problems more approachable from their perspective.

In grading homework, I tend to err on the side of caution. I feel that if a student makes an honest attempt to solve the problem, they should receive some credit for it, thus justifying their efforts. Many other graders immediately give zero credit if the approach is incorrect, regardless of the logic involved in the problem solving process. I try to understand how the student thought about the problem, and even if the initial setup was incorrect, does the rest of the work demonstrate some knowledge about what they have learned in the course. I also think that giving zero credit for attempting, albeit incorrectly, difficult problems engenders a sense of defeat, leading to not even trying future problems. If a student does not immediately know how to do a problem, many resign themselves to it since they believe that they will receive no credit if they cannot solve it.

My past teaching experience has been enjoyable for me. Being able to work with highly motivated and eager-to-learn students brings about a feeling that I am really making a difference. Pursing a career in teaching presents both a rewarding experience and a welcome challenge that I look forward to.