TEACHING STATEMENT

BRIAN SHERSON

I have always had a desire to teach, a desire that dates back to early elementary school. Of course, I started out wanting to be an elementary school teacher, but as I grew older, the kind of teacher I wanted to be evolved. By the time I finished elementary school, I became aware of my mathematical abilities, and my appreciation for mathematics had grown. It was only natural that by the time I graduated from high school, I wanted to teach math.

My outlook on what mathematics is has also evolved from the time I was placed at a higher level in elementary school, and continues to evolve today, even after receiving my Ph.D. in mathematics. This ever-changing outlook has an effect on how I teach mathematics, as I recognize students go through the same process as they learn. Therefore, it is important for me to reflect back on how I previously viewed mathematics as a way to relate to my students.

As a teacher, my goal is not just to present the material, but make the material accessible, and to make the classroom interactive. A math class can most certainly an intimidating and dry experience for some students; I sometimes interject some humor into a lecture to defuse the intimidation, and to make the class more enjoyable. I also like to impress upon my students that mathematics is not a spectator sport. I like to get students involved by periodically posing questions to them as I present the material. While a lecture period presenting material and working out examples is inevitable, I make sure to set aside some of the class time to give my classes time to work through some problems. When covering the rules of differentiation, for example, I always use the last ten to fifteen minutes of class to have students work on some differentiation problems in groups, assigning each group a problem, and having each group send a member to share their solution on the board.

More importantly, I make the material accessible by demonstrating how mathematics can be used to model real life scenarios. Aside from the standard applications of Differential Calculus, such as for use in optimization problems, I make use of real-life examples to help students make sense of symbolic formulas and identities. While symbolic computation is among the skills I would like my students to master, it is at least as important that they see why some algebraic identities and differentiation rules are valid. As an example, in Differential Calculus, a had a student who had difficulty visualizing the chain rule. This resulted in me improvising an example of a car travelling up a mountain highway, showing how the chain rule illustrates the relationship between the velocity of the car, the slope of

the road, and the rate of ascent (or descent) of the car. This example has since then been my standard introductory example to the chain rule.

I also take a constructivist approach to teaching the material, building up to material from ideas students already have at the beginning of the term. It is my belief that tying new ideas to those students already have makes the new ideas more memorable, and that students benefit the most when they can see how mathematical ideas are developed. I prefer my students know that the derivative of a function models slopes and rates of change, as well as understand its applications, and I want them to understand why one sets the derivative equal to zero when solving an optimization. I do not want students to blindly soak in a list of differentiation rules without understanding the purpose of computing a derivative.

My ideal outcome is that a student completes my class with an understanding of mathematics as being a *tool to solve problems* – computation and algorithms are important parts of mathematics, but not the entirety – and to develop an appreciation of what they can do with mathematics. A student should be able to complete a math class with the ability solve problems using the conceptual and computational tools provided to them throughout the term. To me, this means students sometimes must devise their own solutions to problems. For example, in the latter half of a term of Differential Calculus, after students become familiar with differentiation, I would offer some basic antidifferentiation problems, usually limited to polynomials, in hopes that they successfully reverse-engineer the power rule, without having to open up a chapter on integration.

Aside from learning the material, I also encourage students to learn how to communicate mathematics to each other. Indeed, mathematics is a language of its own, and I believe learning the basics of that language is at least as important as learning the content. After all, one does not simply learn a foreign language by simply absorbing the contents of a foreign language dictionary, nor does one simply translate a sentence into a foreign language by performing a word-by-word translation.

When I was a teaching assistant for Discrete Math, I emphasized to my students that a formal paragraph proof is a piece of writing, and not just stream of symbolic computations. Indeed, for at least the proof-writing portion of Discrete Math, I always tell my students to treat proofs as though they were turning in an essay in an English or writing class. One of my most successful bids in encouraging students to communicate mathematical ideas with each other is when I gave group labs as an instructor one term. That term, in reinforcing an idea that the proofs they write should be written with their peers as an audience, I had required that group members look over each other's rough drafts, and provide written comments that were to be turned in with the final drafts when the labs were due. Part of the responsibilities

I endowed upon students in reading their peers' writeups is that they provide feedback as to whether or not the writeups provided enough detail for them to follow.

While I do like to focus on problem solving, I do not neglect providing students with the opportunity to practice their computational skill. Online homework services such as Pearson's MyMathLab are suitable for this purpose. To facilitate problem-solving and modelling real life situations mathematically, I offer weekly written homework assignments, which on average, consists of approximately six problems, and set aside an entire class period for students to work together on solving problems.

When it comes to assessment, I highly encourage students to seek feedback for their work *before* the exams, because I want them to walk into an exam *knowing* that they know the material, as opposed to *finding out* whether they know the material. An excellent venue for this is during office hours, where not only can students receive feedback from me, but it is also a chance for me to get to know a student as more than just a face in the classroom, and also for the student to get to know me as someone who has an interest in their education instead of just another math teacher.