Beginning to incorporate computation and Matlab into my courses

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One of the skills I want my students to be proficient at is mathematics, especially arithemetic and basic maths people use every day. As a young student, I did not enjoy math, mostly because I had mean teachers and little motivation to work hard in an unsupportive environment. Also, I was afraid of math because it was hard. In college, I overcame my math fear with the support of good teachers, mentors, and tutors. I want to be one of those mentors who helps students overcome their math fear and learn the basics. The two strategies I use to help my students learn math is practice and context. If students have a little computation in every assignment, they will learn. If the math practice is veiled in the context of science (e.g., oceanography), students will learn math without thinking of it as practicing math!

I have taught an introductory-level oceanography class to 80-300 mostly non-STEM freshman and sophomore college students. In my Introduction to Oceanography class, I require my students to do arithmetic, unit conversions, and to read and pull data from graphs. This basic math is done on paper for lab assignments, or on paper (or possibly in their heads) to answer multiple choice questions for homework or exams. In such large-enrollment, general education courses, it does not make sense to try to teach computation with a program like Matlab because the cognitive load on the students would be too high -- students would be turned off by having to learn a programming language while struggling with arithmetic. Also, my intro-level students are not necessarily doing iterative computations, so asking them to learn Matlab would be overkill. However, in higher-level courses, with mostly STEM major students, I would like to incorporate Matlab to teach computation so my students can learn useful and powerful computation software and programming language.

I imagine in the future, young college students will enter the university with some coding skills, but the current crop of students seems intimidated by the idea of learning a programming language or any software that requires coding. Therefore, I have created an activity to ease students into using Matlab by introducing a few basic functions and techniques that will teach students to load data into Matlab and plot it. I envision this activity being used for any course as a way to introduce students to Matlab, and give students, especially graduate students, practical guidance for learning Matlab. With this assignment, students will learn code troubleshooting and become familiar with Matlab online resources.

This activity could be either a short, in-class lab assignment, flanked by lectures introducing and reinforcing concepts; or, if students are more novice, it could be assigned as homework or in-class group work with more time and guidance to complete the assignment. Especially for graduate students, this activity provides a flexible framework for the context students are learning and practicing to use Matlab. This activity is simple enough that students of all levels can complete the assignment, but it's flexible enough to be more challenging for other students. For example, teachers could ask students to choose the data set they load in which will likely be less straight-forward than the data set provided for this activity. Students will have to explore answers to questions like: What format is the data in? How many variables need to be named? What should be plotted first? This assignment is a good spring board for teachers and students to begin using Matlab in a practical way, and adjustable enough to be changed or expanded upon for different classes or groups of students.