

Emerging Scholars Program – Fall 2007

M210E – Calculus Workshop

About the ESP Problem Sets

In this class, the majority of our time will be spent working in groups on problem sets, which I will hand out during class. Here are some things to keep in mind as you explore the problem sets:

- The problems are designed to be challenging. You will not be immediately able to solve every problem you encounter on the problem sets. In many cases, you'll need to draw upon the unique skills of your teammates in order to find solutions. Don't be shy about doing this! I want to see good, productive *group* work taking place – this means discussing each problem you work on, whether it seems easy or hard. When you discuss the problems with your teammates, some problems that seem difficult will turn out to be easier than you thought; and conversely, you'll discover that some problems that appear easy are in fact deep or tricky.
- The problem sheet I give you will *not* give you enough space to work out the problems. You'll need to have scratch paper out while you work.
- Feel free to use a calculator to perform numerical computations while you work. Some professors are strictly opposed to the use of calculators in math classes, since calculators can (and sometimes do) tend to become substitutes for actual mathematical thought. But part of my job is to show you the role mathematics plays in the sciences and in the “real world”; and in the “real world”, you're as likely to encounter a calculation like $6.89 \cdot 4.17$ as you are to encounter the calculation $7 \cdot 4$. But try not to become overly dependent on your calculator as you work. When in doubt, use a calculator only to perform numerical computations, and not to perform calculus-related functions such as the taking of derivatives, integrals, limits, and so forth.
- I strongly recommend that you go ahead and start compiling a “problem notebook” for this class. That is, make a commitment to write beautiful, elegant solutions to the problems as you work on them, and keep them in a notebook, together with your other ESP materials (notes, problem sets, *etc.*).
- Don't get so lost in the process of solving a problem that you forget *why* you're working on the problem. I make a very conscious effort to make sure that each problem I give you has some sort of context, backstory, or moral. If you invest some effort in understanding where each problem comes from and why it's important, you'll naturally get more out of the process.
- Perhaps most importantly, don't hesitate to seek help from your classmates, SA's, and AI when you need it. Note the order there – it's important, especially the part about asking your classmates first. One of my goals is to help you become self-sufficient as problem solvers. If I immediately come to the rescue every time you struggle with something, I will be doing you a favor in the short term, but a much greater disservice in the long term. This is why I will very rarely give direct answers to questions – I want to help you develop the intellectual toolbox you need to answer these questions on your own.
- Similarly, please realize that “group work” does not mean “if I know the solution to a problem, I'll tell you how to do it; and if you know the solution to a problem, you tell me how to do it.” Try to foster a collaborative atmosphere within your group as you work on the problems. If you're all equally stuck on a problem, try some different approaches and see if you can work it out together. If your teammate is stuck on a problem that you know how to do, first try to understand where your colleague got stuck – then see if you can help him/her get unstuck without pushing him/her all the way to the end of the problem. This may be difficult for you at first: we are human, after all, and we tend to want other humans to know how bright we are. (At least this has been my experience.) Please keep in mind, though, that this is not a competition – it is a group effort, in which the primary goal is for each group member to become a little stronger each day.
- Last but certainly not least, **have fun**. My personal philosophy is that if you're doing math and not having fun, you're approaching the math the wrong way.