CALCULUS A
A SYLLABUS OF SORTS

Instructor: Tim McLarnan, D212, x-1351; 966-0520 (home, before 9PM); `timm@earlham.edu`.

Office Hours: I teach 8–10 and 11–12 MWF and 1–2:20 T; otherwise, I'm usually in my office. If I'm in my office, I'm available to do mathematics. Please come see me! Of course, if you know in advance you plan to come see me, then it is always prudent to let me know in advance so I can be sure to be in, but you should always feel free to stop by unannounced. If you don't find me at school, feel free to try me at home. One of the great virtues of Earlham is the opportunity for personal contact between students and faculty.

Text: *Calculus Concepts and Contexts (Single Variable),* 4^{th} edition, by James Stewart.

Home page: `http://www.cs.earlham.edu/~timm/CalcA/` . I don't spend much time working on web pages, but I'll try to put any printed material I produce there. Remind me when I don't.

On-line Notes: `http://www.cs.earlham.edu/~timm/InCalc/` contains a set of notes and labs I wrote up several years ago in order to have parallel Braille and text resources for use with this class. These notes do not exactly follow Stewart's sequence of topics, nor are they completely consistent with Stewart's style. I do expect them to be pretty close to my own lectures, though you may need to look around just a bit to see which piece of the notes goes with which day in class. I hope that you'll take a look at them, and that they may prove to be a useful resource. I'd welcome any feedback on them.

Class Schedule: We meet three days a week at 11. We also have one session Tuesday afternoon in the Mac Lab in D224, where we will work on discovering as much of calculus as we can for ourselves. Some of the afternoon "labs" will be exploratory session using computer algebra systems. Other weeks I'll use that time for additional lecture, exam review, or problem sessions working homework together.

Detailed Calendar: Any plan I make now about exactly what we'll be doing on any given day three months from now is pretty much a fantasy. For those who, like me, enjoy reading fantasy, I will put up a detailed calendar of classes and exams on the course web page.

Grading: There will be roughly weekly homework assignments and sometimes weekly lab exercises, which together count 25% of the course grade. Two or three tests will together count 45%. The final will count 30%. The tests and final may have two parts—an in-class component which will be closed book and will test knowledge of basic formulas, techniques, and definitions; and a take-home component which will let you work on more open-ended and difficult problems.

Late work: In order to keep us all caught up and sane, it is my policy not to accept late work in this class.

Work Load: Calc A is a 5-credit course, which means it is probably about 1/3 of your total work load at school. The life of the mind is not a 9-5 job, but a way of life. Assuming rather conservatively that you spend 60 of the 168 hours in a week thinking like a human being, this means you might spend 20 hours a week, or 3 hours a day, doing calculus. This accords with the usual rule of thumb that you ought to be spending 2-3 hours outside class for every hour in

class. Some of this time will be spent reading—one often needs to read mathematical material three or four times before one absorbs all the details. Some will be spent reviewing notes. Some will be spent doing homework, which in any mathematics class is where the real learning takes place. Of course, some of you may well need less than 20 hours a week to assimilate calculus; some of you may need more. Do be sure you budget enough time, though, and to spread it through the week. Assuming you only need to think about calculus in class and the night before an assignment is due is an almost sure formula for lack of success. Sometimes students come to me to complain that they worked for 5 hours on the homework the night before it was due and that it is still not done. I express sympathy, but point out that I wouldn't expect them to be able to do it so quickly, and ask whey they didn't start a bit sooner.

Additional Resources: We'll try to schedule drop-in tutoring several nights a week; I'll let you know the details when we get them worked out. Individual tutoring can be arranged by contacting Supportive Services. The new Math Center in the Science Library is also a huge source of support and fellowship.

Closing Comments: This document is only a dry recounting of mechanics. A real course consists of real people with intellectual and emotional lives. Let me try to roll together a few thoughts about this class, and about mathematics in general.

Calculus is one of the central mathematical discoveries of the human species. Large portions of the subject matter of this course have been discovered independently in England and France and Germany, in Greece, in India, in Japan, and probably in other places as well. Particularly in Europe, it has lain behind much of the mathematical, scientific, and technological development of the past 400 years, but it's a part of the common intellectual heritage of the human race. I hope people can approach it as an intellectual adventure, as a meditation on the quantitative foundations of modern society, as an inquiry into how humans think and reason. Calculus is a tool useful in many facets of many disciplines, but it is more than that. One can learn an enormous amount by getting involved in the questions asked in calculus, in attempting to answer them oneself, in analyzing how Newton or Euler or Bernoulli or Madhava succeeded in answering questions one fails to answer. We're studying the deep structure of human thought and of the universe here, not memorizing algorithms. Get involved.

A big part of involvement is doing the homework in an engaged way. Think hard. Work with others. Ask questions. 98% of the learning in a math class happens when you are actually doing mathematics yourself, not watching someone else do it. Many students think they are bad at math because their teachers make it look easy, and then they find it much tougher than they expected to do problems on their own. This isn't a symptom of being bad at math, though—it's a symptom of being a human. It's not a statement about you; it's a statement about how humans learn math. Math looks easy when someone else is doing it; when you try it yourself, it looks confusing and impossible. That's how life is for everyone, but in that confusion is where learning and understanding are born. So take the homework seriously, and don't panic if you find it hard. Working with hard problems is how you learn.

As you write solutions to problems, remember that you are presenting an argument to a human being. Write to be read. Use sentences. Ask yourself, "Does my homework look like the sort of paper I could turn in to an English prof? Is it written in a style like that of the mathematical prose I see in the text or in other mathematical books, or from the professor? Is my thinking clear? Can a reader of good will read my handwriting and discern where the next word in each sentence is?" Try to make sure the answers are mostly, "Yes." If not, then you are not mastering a skill whose use is ultimately to communicate.

Communicate with me and with others in the class, too. I'm always willing to listen to your thoughts on the subject or on the class, and to share my own, as we work together to build a community of shared inquiry.