

Syllabus for Discrete Math

Basic Information:

Class: Math 231: Discrete Mathematics
Meeting Days: M, Tu, W, F
Meeting Time: 2-2:50 pm
Meeting Room: 102 Deady.

Final Exam: 3:15pm Tuesday, December 4, 2007.

My Name: David Spivak
My Office: 317 Fenton Hall
My Office Hours: Monday 3-4.

Book: Ross and Wright. Discrete Mathematics.

Term Grading Structure and Outline:

Homework: 15%
Quizzes: 15%
PAC score: 5%
Midterm 1: 20%
Midterm 2: 20%
Final Exam: 25%

Homework will be assigned on Wednesdays and collected on Tuesdays. Sometimes something happens in your life and you can't complete a homework on time. For example, a death in the family, an illness, massive amounts of homework from another class, a party. In this case you may "drop" that homework from your grade. You may drop exactly one homework during the quarter, even if you have multiple calamities, so use it wisely!

Please don't email me with math questions. These things are best communicated in person. If you need to know an answer before I'll next see you, go to the Braddock Tutoring Center (155 Lillis Hall), or call a friend from class.

Quizzes will be on Wednesdays. You may drop 1 quiz throughout the quarter (with the same reasoning and description as for dropping homework).

In this course, we'll cover chapters 1 through 4 of Ross and Wright.

Test dates:

Test 1: Friday, October 12.

Test 2: Friday, November 2.

Final: Tuesday, December 4.

Details and Philosophy:

The following details and philosophy is subject to minor changes, as result from the evolution of our class throughout the quarter. Please tell me if you have questions or suggestions.

Homework

The purpose of doing homework is to get acquainted with subjects that you don't already understand. It is not to prove that you understand something. The results (answers) to homework problems are fairly irrelevant. The process is far more important. Math is like a child: spend quality time with it and things will turn out well. Just finding the answers somehow is like just buying the kid gifts: it is no substitute for quality time.

This course will have a grader, and this grader will have a personality of his or her own. The grade you receive on your homeworks will be a function of many variables, and one of them is the grader's personality (grading style). This is a reality you are going to have to deal with. On the other hand, you are invited to engage the grader directly about questions you have about your grades.

Here is how I envision the homework process. When you do your homework, either alone or in a small group, your goal is to access and enunciate your own points of confusion. By "accessing" your points of confusion, I mean finding them for yourself, and by "enunciating" your points of confusion, I mean writing them down for the grader.

If a certain problem presents you with no points of confusion, then you will complete it and write the answer. If it does confuse you, you will attempt to resolve the confusion. If you can resolve your confusion, continue with the problem until the next point of confusion; if you don't resolve your confusion, clearly and concisely enunciate your point of confusion to the grader by writing it down on your homework paper. Then move on to the next problem – don't worry about the answer. Seriously, knowing the answer is not as important as you have been led to believe.

The grader will attempt to understand my philosophy and attempt to grade the homework in accordance with it. That is, if you write down why you are confused instead of writing an answer, you'll get full credit.

Quizzes

You will have a quiz every week. It will test basic concepts, as directly as possible. My philosophy on quizzes is the same as on homework. If you get confused, spend your time finding the source of the confusion. Once you've done so, play with it until you begin to find yourself moving again. Don't be afraid to move backwards, if needed. If you can't find the answer, write down why you are confused. It will not be full credit (as it is on homework) but doing so will be worth points.

PAC score

PAC stands for Personal Addition to Class. This is purely a subjective grade which I will assign you at the end of the term, possibly with your input.

When you ask questions that get at the heart of your ignorance, you make me happy. When you make others feel comfortable asking questions that get to the heart of their ignorance, you make me happy. Ignorance is not a problem, even though the word is typically used in a very negative way. What often *is* a problem is trying to hide your ignorance: let it out! Flaunt it! Einstein once said "If you don't know something, say it loud."

Of course sometimes, you may ask a question which would be better handled in my office hours. In that case, I'll tell you so. In other words, you don't have to worry about the boundaries of what you can ask in class – ask anything.

At the end of the term, you'll in some sense get to grade my PAC score on an evaluation form. The course material is as it is – you will grade me on how well I contributed to the class itself. Similarly, I will grade your PAC score not on how well you understood the material, but on how engaged you were and how willing to improve your experience and the experiences of those around you.

In some sense, the PAC score is free points. Just be yourself, foster creativity in yourself and others, come to class, and you will get 5 percentage points for free. On the other hand, please do me this favor. If you don't choose to work towards adding to the classroom environment, don't come to me at the end with some sort of death-bed change-of-heart. Don't come to me with dishonesty and attempts to improve your grade beyond what you know you deserve. My compassion for students could be seen as a weakness of mine; please don't exploit it for your own gain.

Tests

Tests have a three-fold purpose. First, they encourage you to learn throughout the quarter. Second, they assess your knowledge. Third, learning actually takes place during the tests. Please understand that you are encouraged to learn things you didn't already know even as late as during the tests.

The best time to discover your own sources of confusion is as they arise. If you do the homework in the way I've suggested, you will discover your points of confusion and can

address them during the homework process. This way, you will do well on the tests.

Instead of thinking of the exam as a test of your knowledge, think of it as a test of your commitment to the homework, or more precisely, to the process of engaging the math you are presented with throughout the semester. Don't learn how to solve the problems, learn to understand the mathematical truths behind the problems. This will make you much more effective.

If your goal in this class is to get an A, I'm sorry to tell you that you may find it to be a painful experience. If your goal in this class is to see if you can actually be interested in the subject matter, you will find the experience enjoyable and probably get the grade you want in the process. I believe this to be so. If your personal experience begins to run counter to this, come talk to me and we can search together for the problem.

What is Discrete Math?

The word “discrete” could be thought of as the opposite of the word “continuous.” Think about a bunch of dots or a bunch of objects that aren’t touching each other. Humans classify that which they see in to types. If these types run together, we say that there is a “grey area.” If they are totally separated, we say they are discrete.

How many ways are there to rearrange the letters in the word “good”? Let’s back up; is this a continuous problem or a discrete problem? Well, is there a grey area between good and godo or between godo and gdoo? No; these are discrete permutations of the four letters in “good”. Thus, this is a discrete problem, and it will be studied in this course.

Sets are usually thought of as collections of discrete objects (objects with no grey area). For example, consider the set P of people in the world. For each object x in the world (like Carol, or a picture of Carol, or North Carolina, or whatever), we can ask ourselves whether x is an element of P . Is this a discrete problem or a continuous problem? In this class, we’ll pretend that it’s a discrete problem, though in my view the whole debate over abortion proves that it is in fact a continuous problem: the one-cell zygote develops into a person over the course of time, and it is difficult to ascertain whether it is or is not a person at any given time. In other words, there is a grey area with regards to the set P .

My point with this example is to explain my view that sets, and math in general, *models our reality* but is not actually “real.” Everything we study is true in and of itself (i.e. it is self-consistent), but attempting to apply it to the real world is never really “true.”

As a result, there are some definitions which may confuse you. For example, in mathematics there is no notion of causality. As a result, a mathematician might say “if every dog is purple, then my computer will learn to eat grass.” While it’s true that probably no one knows what the eff the mathematician is talking about here, it’s also the case that in this class we will say that his or her asinine statement is TRUE. Why? Because we *define* the if-then sentence structure to be such that when the antecedent (“every dog is purple”) is false, then the entire statement is automatically true, regardless of how ridiculous it is. This will bother you if you are attached to the idea that if-then statements involve causality. In math, it doesn’t.

Conclusion

Please try to understand my philosophy, because it will govern the class and your part in it. One part of my philosophy which you should understand is that I am interested in communicating as much knowledge to each of you as I can, thereby improving everyone’s experience in the class. My philosophy is first and foremost one of “evolution.” Therefore, if my stated philosophy conflicts with what is best for the class, then I will be happy to change it. We’ll talk.

Please also take seriously your part in this class. Your engagement in the class will be the strongest indicator of your success in and your enjoyment of the class.