Welcome to Math 10A!!

Kenneth A. Ribet

August 24, 2017

Destination Check

Hi Everyone!!

This is Math 10A, Lecture #2. I am Kenneth A. Ribet, instructor for the course.

Lecture #1 is given by my colleague Zvezdelina Stankova and meets TuTh in 2050 VLSB at 11:10AM.

Slides

Today's slides contain practical information about the course that we are about to start.

The general rule about slides is that you never have to take notes from them. All slides will be posted to **bCourses**. Some slides can be grasped in real time, but many require attention after the lecture is over.

Course capture

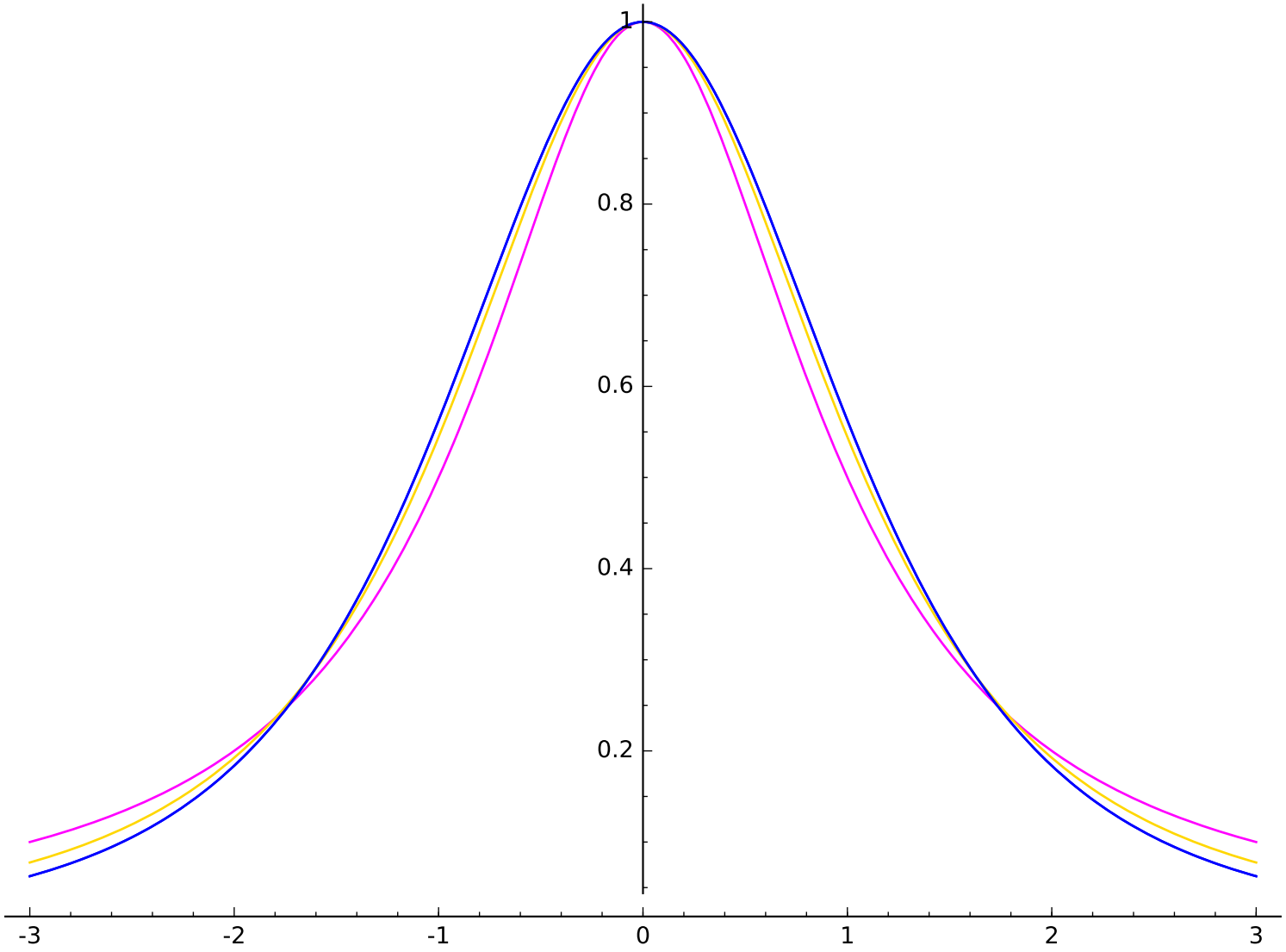
The audio track of each lecture will be available to you via **bCourses**. Along with the audio, you will see any video that is projected on the screen—including the slides.

Anything that I write on paper and project via the document camera will be captured.

Material that's written on the chalkboards will not be recorded. However, writing with chalk is the traditional way for people to explain math.

I invite feedback on the relative effectiveness of the chalkboards, the slides and the document camera.

The slides are useful for showing pictures.



Who am I?

I am Ken Ribet, Professor of Mathematics at UC Berkeley. I have been here for decades.

My home page is https://math.berkeley.edu/~ribet/. On that page, you can find such information as my email address (ribet@berkeley.edu), my office location (885 Evans Hall), my office phone ((510) 642-0648), and my office hours (https://math.berkeley.edu/~ribet/office_hours.txt).

If you're curious and *really bored*, you can find evidence of my presence on YouTube, Facebook, Yelp, twitter, Instagram, ...

Course Web Page

https://math.berkeley.edu/~ribet/10A/

Some resources will be available on **bCourses**; some on this home page.

For example, the **Class Schedule** is available on the course web page.

If you can't find information that you need, ask on piazza and you should get an answer real quick.

Students often post things are send me email late at night. They are astonished when I write back to them *even later* that same night.

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About piazza

Piazza is a discussion forum for this course. (Yes, I know that **bCourses** has a discussion tool as well.) It's good for asking questions, making comments and getting answers.

Optimally your instructor (= me) or a GSI will be able to comment on issues that haven't gotten immediate answers from other students. Students should jump in as they like.

Please don't post anonymously unless you really need to.

Textbooks

The main textbook for this course is the book Calculus for the Life Sciences by Sebastian J. Schreiber. All editions are OK, as long as the essential content (including the exercises) is the same as in the edition sold in the Cal bookstore.

This textbook is supplemented by three .pdf files on **bCourses**:

- Differential_calculus.pdf
- Integral_calculus.pdf
- Prob-Stat.pdf

Finally, the slides that I write for lectures might be viewed as a further supplement to the Schreiber textbook.

Books for Sale

There are at least a half-dozen 10A students from 2016 who want to sell their used books to you. Asking prices are hovering around $50. The list of students who were selling books (as of Wednesday evening) appears on the last slide of this slide deck.

Lectures, Discussion Sections, Office Hours

The lectures in this room are the core of the course. Come to lecture every Tuesday and Thursday, ready to listen, to think and to participate. Don't be afraid to speak up. If we're not having fun together, we're doing something wrong.

In this room, we unplug: please put away all phones, tablets, laptop computers and other devices.

> *Our results showed that nonacademic Internet use was common among students who brought laptops to class and was inversely related to class performance. This relationship was upheld after we accounted for motivation, interest, and intelligence. Class-related Internet use was not associated with a benefit to classroom performance.*

http://journals.sagepub.com/doi/full/10.1177/0956797616677314:

The lecture period is 80 minutes long. It starts at 8:10 and ends no later than 9:30. We'll have a 5-minute break in the middle. Don't hesitate to call out for a break if you need one. Ask for a joke if you need one. If it's 9:30 and I haven't stopped, tell me to stop. We are all in the same room together.

Discussion sections are held Tuesdays and Thursdays—the same days as the lectures. This is not the usual way, but we'll try it and maybe even like it.

My best guess is that you'll find your GSI to be friendly, approachable, not much older than you and down to earth.

You will meet her or him later today. Yes, discussion sections start *today*.

I will hold office hours each week, some on my office (#885 Evans Hall) and some in the Student Learning Center. Come to my office hours to introduce yourself, ask really dumb questions (which actually won't be dumb at all) or just hang out. The SLC, by the way, is really chill. When I sit at a long table with students, I feel strongly that we're all on a common mission.

Your GSI will have office hours as well.

My office hours

Mondays, 1:45–3PM, in 885 Evans Hall

Wednesdays, 10:30–11:45AM at the Student Learning Center

Study Groups

Meet people in this class. You can do that during the break in the middle of this period. Form study groups. Work on problems together. Share the experience.

Homework can be done collaboratively, but you need to write your answers all by yourself, so that you're sure you understand what you're doing.

Homework

Homework will be due once per week, initially on Thursdays. The first assignment will be posted today and will be due on August 31.

We will drop the lowest $1\frac{1}{2}$ homework scores: if there are 13 homework assignments, each worth 10 points, the maximum homework score will be 115.

Quizzes

There will be approximately 10 quizzes during the semester. These are 20-minute quick exams that are held in discussion section. They will be held on days when homework is *not* due. The first quiz date is Tuesday, September 5.

We will drop each student's lowest quiz score.

Grading

This course has four components:

- midterm exams are worth 20 points each, for a total of 40 points;
- the final exam is worth 35 points;
- homework is worth 10 points;
- quizzes (given in discussion section) are worth 15 points.

If you do everything perfectly, you will have earned 100 points. The number of points you've earned is your *composite score*.

Final letter grades are computed from the composite scores. Last year, 30% of my students got *A*s, 39% got *B*s and so on. See the course web page for the "and so on."

What if I do badly on a midterm?

STOP PRESS: We will devise a numerical scheme where a strong grade on the final can overcome a single bad midterm grade. Roughly speaking, your composite score will be

$$\text{HW + Quiz scores} + \text{good midterm} + (55/35) * \text{final exam}.$$

The "roughly speaking" involves tweaking because of differing median scores on the various exams.

A system somewhat like this will be used in the other Math 10A section.

Exam dates

Please mark these dates down on your calendar and make sure not to miss an exam.

- **First midterm exam** September 26 in class;
- **Second midterm exam** October 26 in class;
- **Final exam** Thursday, December 14, 7–10PM.

The second midterm is cumulative in principle but covers mainly the second third of the source. The final exam is cumulative.

If you are an intercollegiate athlete or belong to a club with off-campus activities, please see the campus policy on missing exams.

The date of the first midterm changed

As I learned this week from the campus's calendar of religious holidays, Rosh Hashanah falls on September 21 this year.

What to study for exams?

Exam question are based on:

- themes and examples explored in the lectures;
- examples in the book(s);
- homework problems;
- quiz problems in the sections;
- questions from previous years.

Where can I find quiz questions and old exam questions?

The GSIs will deposit quizzes in a Quiz folder on **bCourses**.

bCourses will also have an "Old Exams" folder with questions by other profs. You'll find questions from my exams last year on the home page for the course that I taught in 2016. (For each exam, I provide a stripped-down file with just the questions and another file with both the questions and some hastily written answers.)

Social Events

For the past bunch of years, I have been organizing breakfasts and lunches with students at the Faculty Club. These are totally opt-in events; you can come once, many times or never. Students pay for their own meals.

Tuesday's breakfast

Breakfasts are held in the Kerr Dining Room of the Club. That room is fairly buttoned down, and we need to make reservations. Experience shows that 20 people is the largest group that they can accommodate. I collect money from students and launder the charge through my Club account (thereby getting us a discount).

In my email to the class, I announced breakfasts on August 22 at 9AM and breakfasts on August 28 and August 30 at 8AM. All three of the events filled up; we had 21 people at the table on Tuesday.

I started an overflow breakfast for 8AM on Monday, September 11 for students who wrote in after the places in the first three events disappeared. This fourth breakfast is now full.

There is now a fifth breakfast scheduled for Monday, September 18 at 8AM. Please send me email to reserve a spot on the 18th.

Lunches are in the Great Hall, which is a much larger room. I call them “pop-in lunches” because people can just show up and find seats. Everyone takes a tray, grabs food from the buffet areas and pays the cashier. Credit cards are accepted, but there’s a $10 minimum for credit card payments; this minimum is sometimes waived for students.

There’s a pop-in lunch on Friday, August 25 at noon. I tend to organize noon lunches most Fridays.

I'll be happy to come to lunch in the DCs: form a group and invite me to join you. If I'm not traveling or already organizing a pop-in lunch, I'm very likely to be free. I will ask to get swiped in and believe that my request is OK because almost everyone with a meal plan ends each semester with extra points. (If this is incorrect, please tell me.)

Student Learning Center

Andrea Nguyen is here to explain the services that are offered by the SLC. The page http://slc.berkeley.edu/math-10a summarizes what's available.

Break

Functions

For the rest of this period, I will talk about *functions*, §1.1 of the Schreiber book.

I will do this using slides, and then using the chalkboards.

If there is time, I might try to document camera (functions served three ways).

A function is defined on a set of real numbers (the *domain* of the function) and has real values. A function can be defined by a rule, procedure or formula. (Maybe there are more possibilities.)

In high school you might say that $\sqrt{100 - x^2}$ is a function. It's a formula, but you can view it as a well-defined function:

$$x \mapsto \text{the positive square root of } 100 - x^2.$$

For example,

$$6 \mapsto \sqrt{100 - 36} = \sqrt{64} = 8.$$

Note that $\sqrt{64} = 8$, not -8 or ± 8.

You get to decide the domain, the place where the function is defined. The formula makes sense only for x between -10 and $+10$ (inclusive), so the domain has to sit inside the interval $[-10, 10]$. The most "natural" domain for this function is that whole interval.

Did you notice that I made sure to bring in the number 10?

The issue with $\sqrt{100 - x^2}$ is that you can't take the square root of a negative number.

The function $F(x) = \dfrac{3x - 1}{x + 1}$ has a problem at $x = -1$ because you can't divide by 0. Its natural domain of definition is the set of real numbers different from -1.

In calculus, one encounters lots of functions like

$$G(x) = \frac{x^2 - 1}{x + 1}$$

that appear to have a denominator-related problem but turn out to have less of an issue than one might guess.

Here,

$$G(x) = x - 1 \text{ for all } x \neq -1.$$

Even though $G(x)$ is not defined for $x = -1$, we would naturally come up with the value $G(-1) = -2$ if someone pressed us hard to supply one.

Here's a function on the set of integers $0, 1, 2, 3, \ldots$:

$$f(n) = \text{the } n\text{th digit to the right of the decimal point in } \pi.$$

Thus $f(0) = 3$, $f(1) = 1$, $f(2) = 4$, $f(3) = 1$, and so on, since

$$\pi = 3.1415926535897932\cdots.$$

It's helpful to know that the expansion of π never terminates, so there's no ambiguity in defining the values of the function.

Here's a function that comes to mind: $g(n) =$ the number of ways of dividing up a class of n students into study groups with two students each.

Clearly, $g(n) = 0$ whenever n is odd.

Mathematicians would say that $g(0) = 1$. Also $g(2) = 1$. How about $g(4)$?

If you have four students, pick one arbitrarily—call him Ishmail. Then you have three choices for Ishmail's partner. After you've chosen that partner, everything is set. Thus

$$g(4) = 3.$$

If you like this kind of question, take Math 10B.

Appendix: Students who may have textbooks to sell

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