New Instructor Training at UMich: Promoting Engaged Learning

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Overview

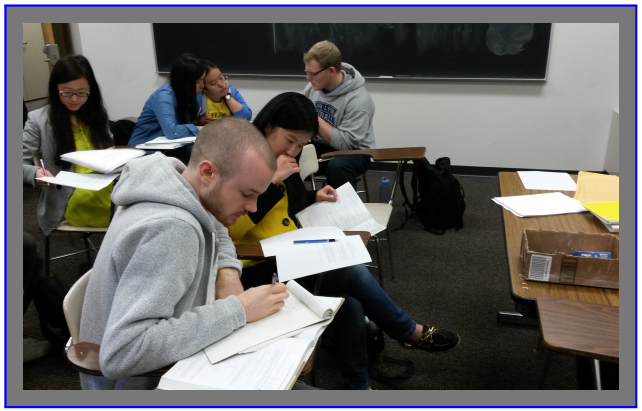
Where we are, and where we are going.

The University of Michigan Math Department has had some sort of new instructor training for about 35 years.

. . . for about 25 years of those this may have been reasonably good. So we will try and see what there is to be said about it.

Outline

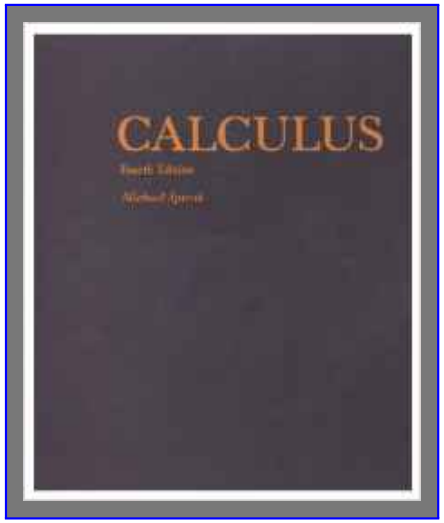
- History of our training,
- and the courses we teach,
- what our current training looks like,
- and some other things on which we are working.



Prehistory

a book and a room number.

UM math teaching, c.1980.



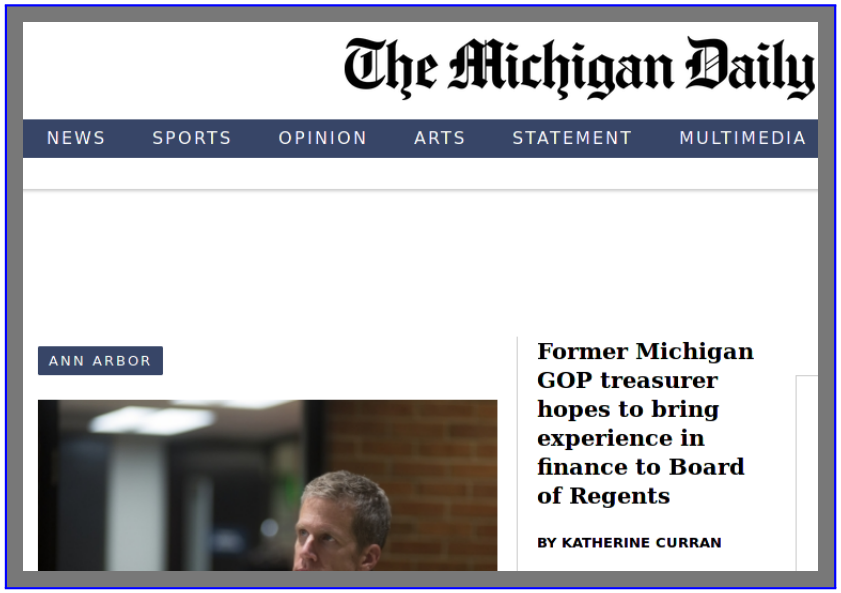
Context:

- Pre-graduate student union: the department has a lot of graduate students, some of whom finish, who teach.
- Calculus class-sizes 30–40 (cap at about 30 for graduate students).
- Prehistory $\Rightarrow$ caricature.
  - . . . *some of it correct*

Early Training (c.1985)

"The most reviled course on campus."

- Quality of instruction starts to be an issue.
- Training program started: for international students...
- and then expanded to support for all graduate students.



Reform (c.1992)

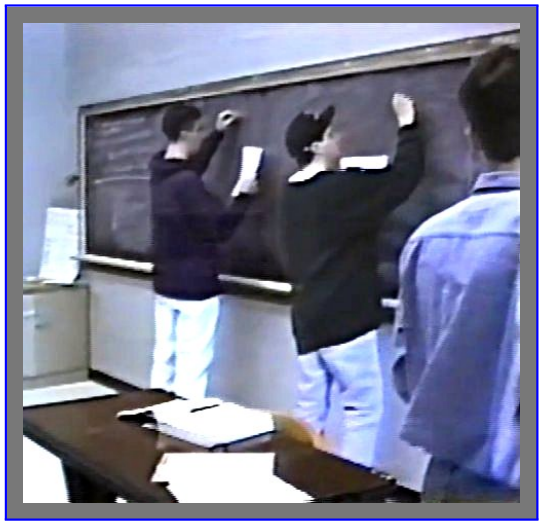
The regents come calling.

- "The chair was called to speak with the regents"
  - (Some) faculty step up
- Reform: *"some idiot gave Mort a graphing calculator."*
  - Reform is a slippery slope.
  - Adopted the Hughes-Hallett textbook.
  - And revised the pedagogy in the course.

A New Pedagogy

New Wave Calculus

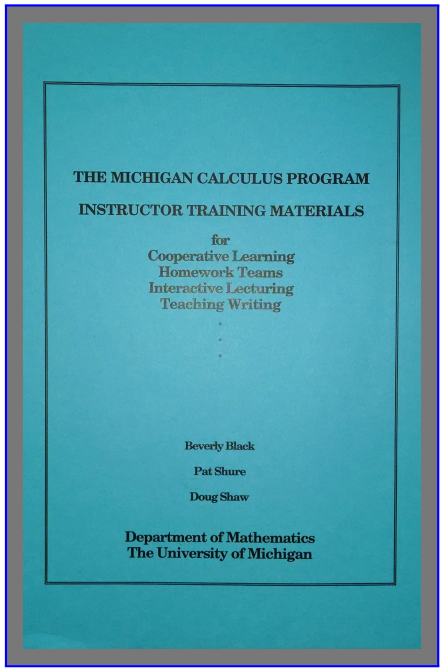
- Class sizes of 24 (perhaps).
- Collaborative rooms
- Team Homework
- Student presentation



A New Training

Heck—this is hard.

- Training extended by 2 days
  - So: 1 week + 2 days!
  - *This did not not continue.*
- Emphasis on calculators, and logistics
  . . . and pedagogy?
- This program then evolved to the current training program.



Michigan's Introductory Program

91 sections of calculus?

Math courses we offer:

- Course before ("pre")calculus, calculus I, calculus II.
- Number of students (this fall): "pre"calculus, 530; calculus I, 1600; calculus II, 770.
- . . . in sections of 18 (as of fall 2016). (Thus: 35 of "pre"calculus, 91 of calculus, 44 of calculus II.)
- very, very, very uniform.

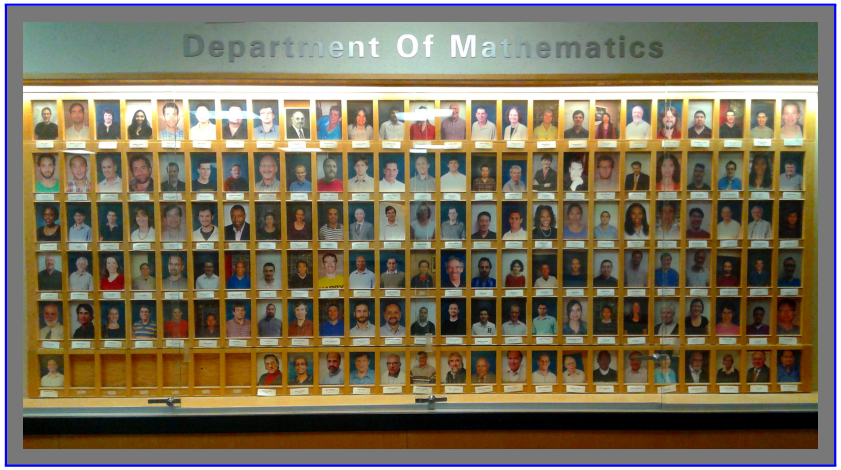
Other Tracks

. . . but wait, there's more

- Honors track
- Honors seminar
- Inquiry Based Learning center courses

Instructors and Students

13% of math postdocs in the US?



- Most Introductory Program courses are taught by
  - Graduate students
    (∼120, teaching 1/1)
  - Post-docs
    (∼70, teaching 1/1, 2/1, or 2/2)
  - Plus 7 lecturers
    (teaching 3/3).
- Implication: we have 50–65 new instructors each fall.

Pedagogy

And this is what we do

Introductory Program Courses

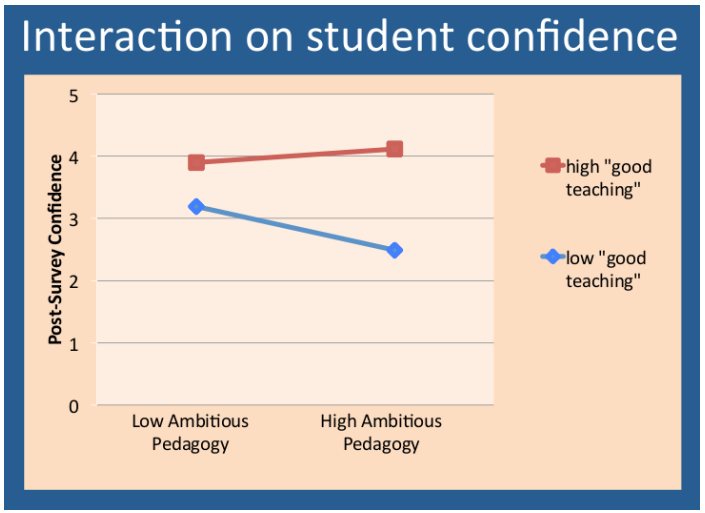
- Classrooms with tables seating four
- Mini-lectures only.
- 50%(–70%) group work in class.
- Group work on worksheets or problems, with
- Presentations by students.

- Support for instructors includes lesson plans, weekly meetings. . .

Training Philosophy

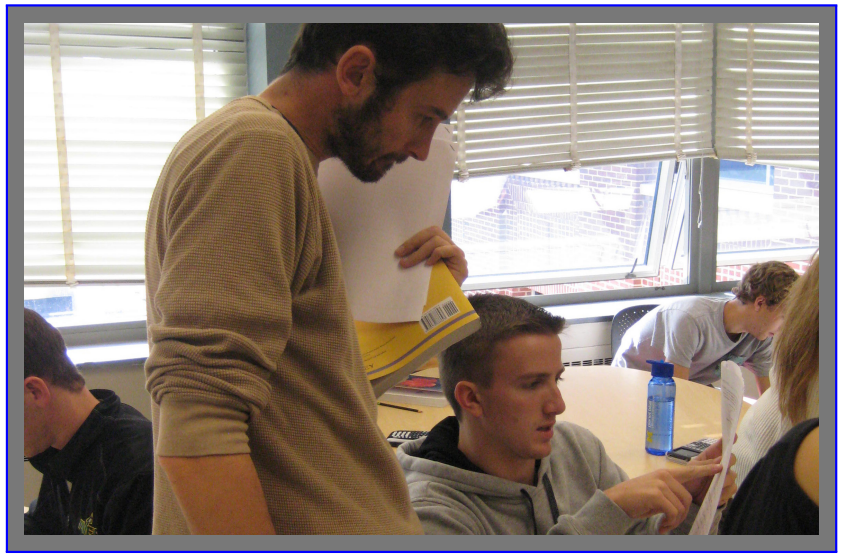
we think, therefore you teach this way

- This type of teaching works.
  - *Laursen, Freeman, CBMS*
- Though it isn't easy
  - Bressoud: is poor use worse than non-use? *(2016)*
  - Bio study *Andrews, et al. 2011*



Scope and Numbers

We'll have your course assignment. . . on Thursday

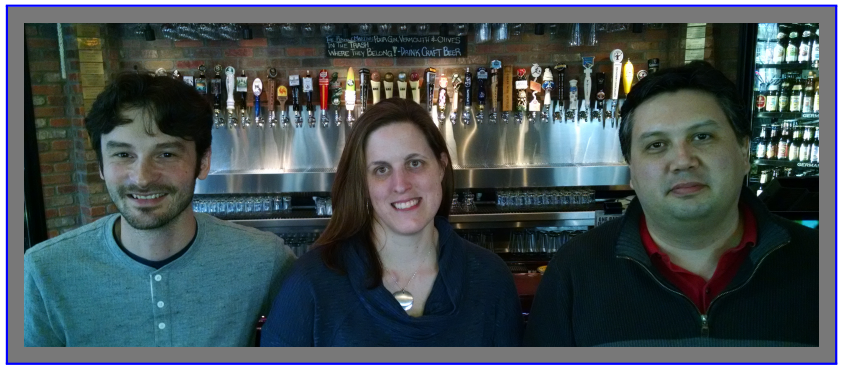


- Instructors in our training program almost exclusively teach "pre"calculus and calculus I.
- This fall we trained ≈55 new instructors (about half graduate students, about half post-docs).
- And is run by 6–10 faculty and graduate student coordinators.
- Training runs the week before classes (Labor day).

The Trainers

“Ask your coordinator.”

- Paul Kessenich,
  Angela Kubena,
  and Fernando Carreon
- . . . and Hanna Bennet,
  Scott Schneider, and me
- . . . and Stephen DeBacker, graduate student co-coordinators



The Schedule

"Bring your ID."

University of Michigan Mathematics Department
Professional Development Program, Fall 2016

	Monday, August 29	Tuesday, August 30	Wednesday, August 31	Thursday, September 1	Friday, September 2	
9:00	All NEW graduate students **Math Dept Orientation** *(9:00 - noon)*	**Video Lecturing** *(7 minutes each, Groups A-H)* **Asking Questions** *(Groups AA-HH)* CCL 1528		**Running an Interactive Classroom** *(10 minutes each)* MH	**CRLT Presentation: 7 into 15 and Inclusivity in the Classroom** CCL 1528	**9:00**
9:30			**Extended Individual Practice Lecturing** *(12 minutes each, graduate students only)* MH [Note: 9:30 start time]			9:30
10:00						**10:00**
10:30	Faculty **Capsule Research Talks** *(20 minutes each, 9:00 - noon)*	**Video Lecturing** *(7 minutes each, Groups AA-HH)* **Asking Questions** *(Groups A-H)* CCL 1528				10:30
11:00				**Grades, Ethics, & Values** (Umang, Salman, Bob) CCL 1528	**Course Administrivia & Course Meetings** CCL 1528	**11:00**
11:30						11:30
12:00	Lunch provided *(for all--EH Atrium)*	Lunch *(on own)*	Lunch *(on own)*	**Team HW in Action** (Angela, Fernando) CCL 1528	Chairman's Lunch *(for all--EH Atrium)*	**12:00**
12:30				Lunch *(on own)*		12:30
1:00	Faculty **Introductions and Department Overview** EH 1360	**Michigan Math In Action** *(Course features, student profiles)* Staff CCL 1528	**Most Things You Worry About Never Happen** (Gavin, Bob) CCL 1528			**1:00**
1:30				**Understanding Student Thinking** (Scott, Angela, Bob) CCL 1528	**Getting Ready for Your First Class** (Salman, others) MH	1:30
2:00	Faculty **Capsule Research Talks** *(20 minutes each, 2:00 - 3:00)*	**The Groupwork Fractal (The Cooperative Classroom)** (Gavin, Hanna, Fernando) MH	**A Day in the Life (The Interactive Classroom)** (Umang, Stephen, Scott) MH			**2:00**
2:30						2:30
3:00	***Dominicks!!???!***			**Math 105/115 Course Meetings** *or* **Course Specific Q&A** CCL		**3:00**
3:30						3:30
4:00		**GEO Meeting** *(grad students)* CCL 1528 **LEO Meeting** *(lecturers)* MH 2325	**Tech Breakout Sessions:** **Calculators** *or* **Canvas and Candy** *or* **LaTeX and Licorice**	**Professional Responsibilities** (Mel) CCL 1528		**4:00**
4:30						4:30
6:00			**Fake It 'til You Make It** *(grad students only)*			

[Note: All shaded sessions are required.]

[Updated 8/25/16]

A Focus on Active Learning

"Feign a medical emergency"

Goals

- Address immediate needs
  - Lecturing
  - "Problem students"
  - Teaching logistics
- And prepare (and convince) instructors to use active learning
  - Introduction
  - Groupwork Fractal
  - Day in the Life
  - Running an Interactive Classroom

A Work in Progress

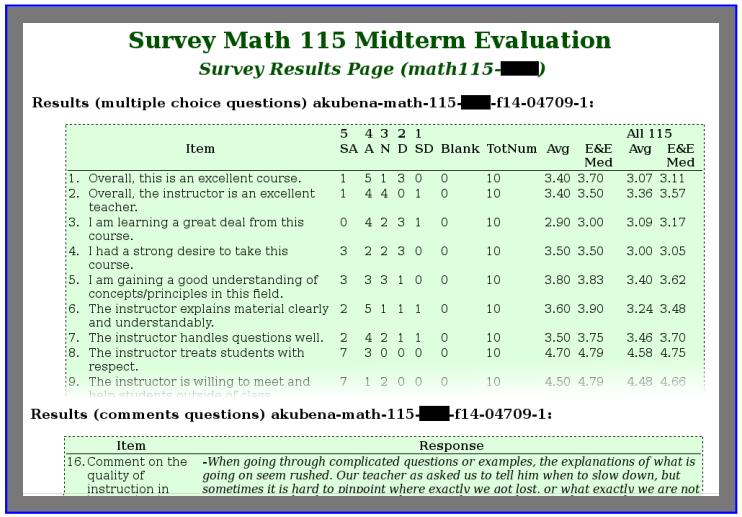
Next year's program would be perfect for this group

- Changes are largely incremental:
  - Michigan Math in Action
    This year: intro
    Before that: first day presentation
  - The Groupwork Fractal
    IBL Workshop
  - Most things. . .
  - Instructors as students
  - Running interactive. . . vs. homework problems
- Move toward Increased focus on active learning and the big problems in teaching.

After Training Week

It never ends

- Lesson plans
- Instructor meetings
- Class visits
- Midterm evaluation surveys



Survey Math 115 Midterm Evaluation

Survey Results Page (math115-[redacted])

Results (multiple choice questions) akubena-math-115-[redacted]-f14-04709-1:

Item	5 SA	4 A	3 N	2 D	1 SD	Blank	TotNum	Avg	E&E Med	All 115 Avg	All 115 E&E Med
1. Overall, this is an excellent course.	1	5	1	3	0	0	10	3.40	3.70	3.07	3.11
2. Overall, the instructor is an excellent teacher.	1	4	4	0	1	0	10	3.40	3.50	3.36	3.57
3. I am learning a great deal from this course.	0	4	2	3	1	0	10	2.90	3.00	3.09	3.17
4. I had a strong desire to take this course.	3	2	2	3	0	0	10	3.50	3.50	3.00	3.05
5. I am gaining a good understanding of concepts/principles in this field.	3	3	3	1	0	0	10	3.80	3.83	3.40	3.62
6. The instructor explains material clearly and understandably.	2	5	1	1	1	0	10	3.60	3.90	3.24	3.48
7. The instructor handles questions well.	2	4	2	1	1	0	10	3.50	3.75	3.46	3.70
8. The instructor treats students with respect.	7	3	0	0	0	0	10	4.70	4.79	4.58	4.75
9. The instructor is willing to meet and help students outside of class.	7	1	2	0	0	0	10	4.50	4.79	4.48	4.66

Results (comments questions) akubena-math-115-[redacted]-f14-04709-1:

Item	Response
16. Comment on the quality of instruction in	*-When going through complicated questions or examples, the explanations of what is going on seem rushed. Our teacher as asked us to tell him when to slow down, but sometimes it is hard to pinpoint where exactly we got lost, or what exactly we are not*

. . . ask your coordinator

Summary

almost done

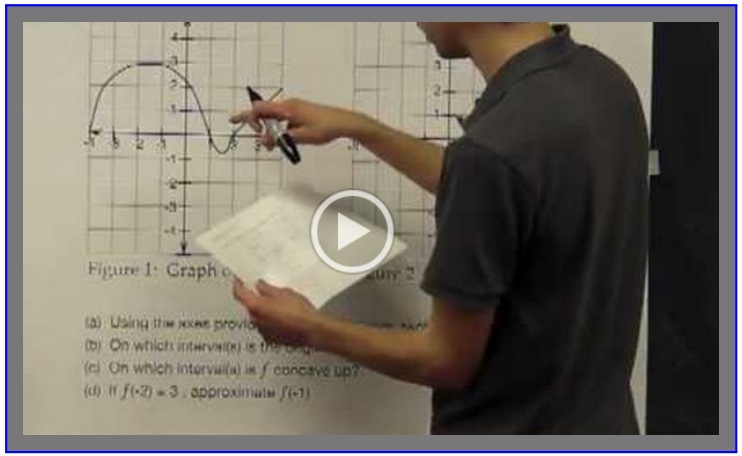
- This is a pretty big operation
  - With a pretty big footprint
- Most instructors buy in
  - Most are pretty good
- Some are outstanding

assessment

And we think it works. . .

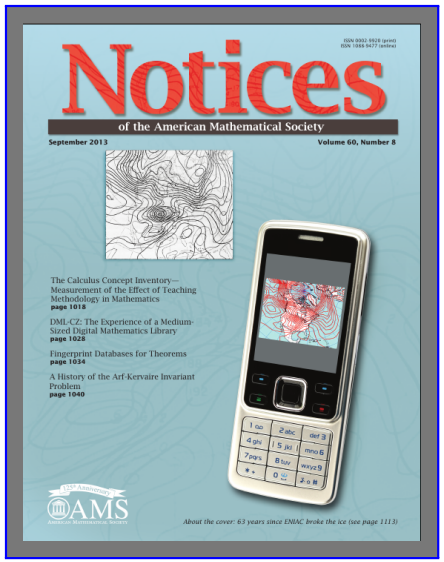
Outcomes

“Never mistake activity for achievement” –J. Wooden



Evidence that it works:

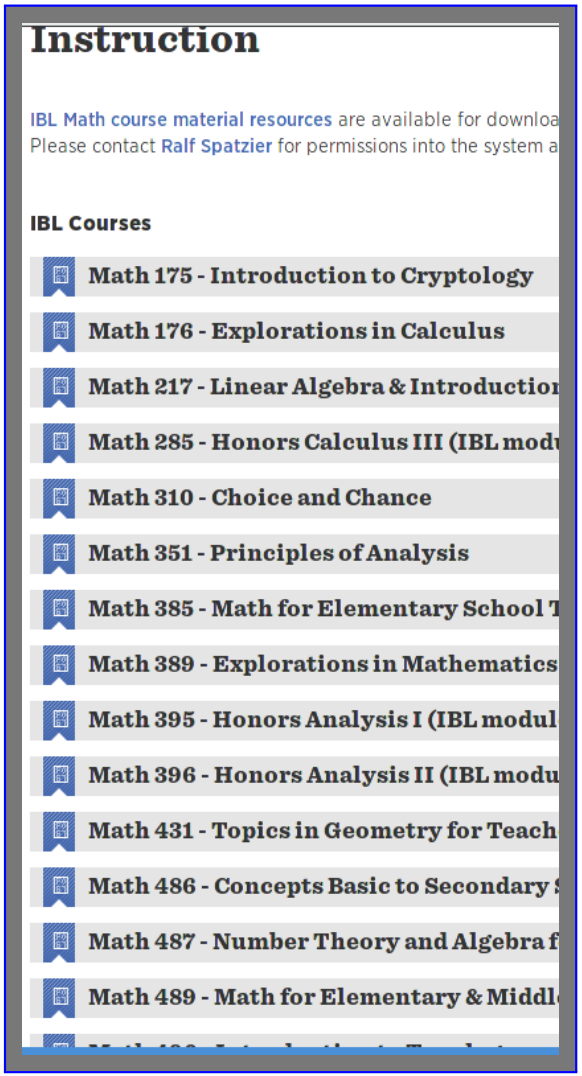
- “M” and the teaching seminar
- CCI Results
  - . . . et. al
- David’s calculus project
- I’m here



IBL Center and Training

Never too much of a good thing

- IBL Center and training
  - (not only) the shadow knows
  - sustainability and generalization
- "Fishbowl" course
  - Work with the School of Education
  - Target instructors: IBL instructors, more advanced introductory program instructors, graduate students teaching calculus III and differential equations labs



Questions?

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