Running a Discussion Section

Eric Lybrand, Jeff Rabin, Jacqueline Warren

UC San Diego

Announcements

- Teaching statement due on Gradescope tonight by 11pm.
- Reserve a homework box for your course if you have not already. Have at least two discussion sections to a box when possible.
- Have you contacted your course's instructor? What about the grader?
- Eric and Jacqueline will start observations next week.

Overview

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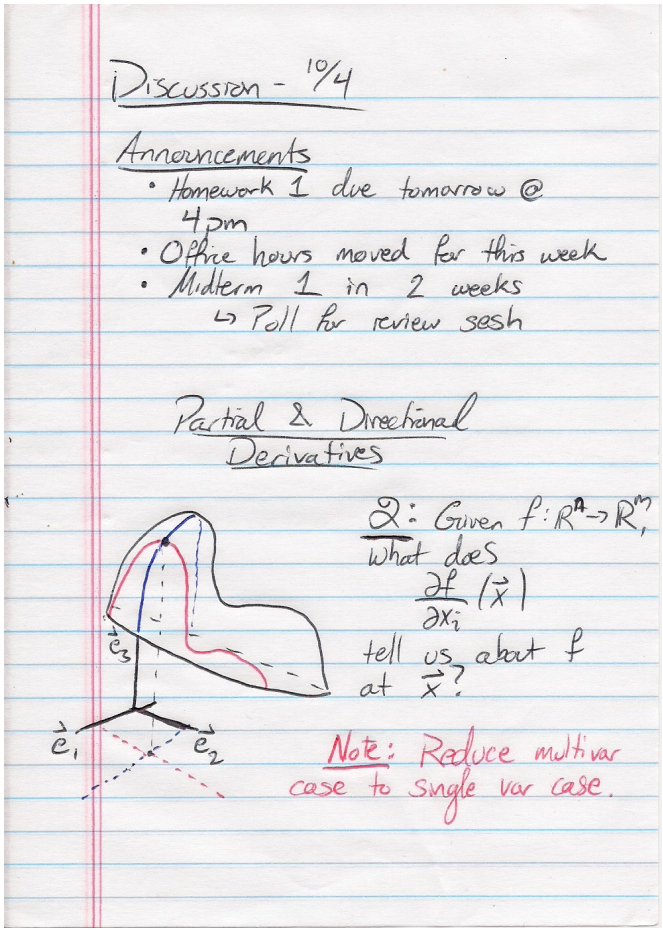

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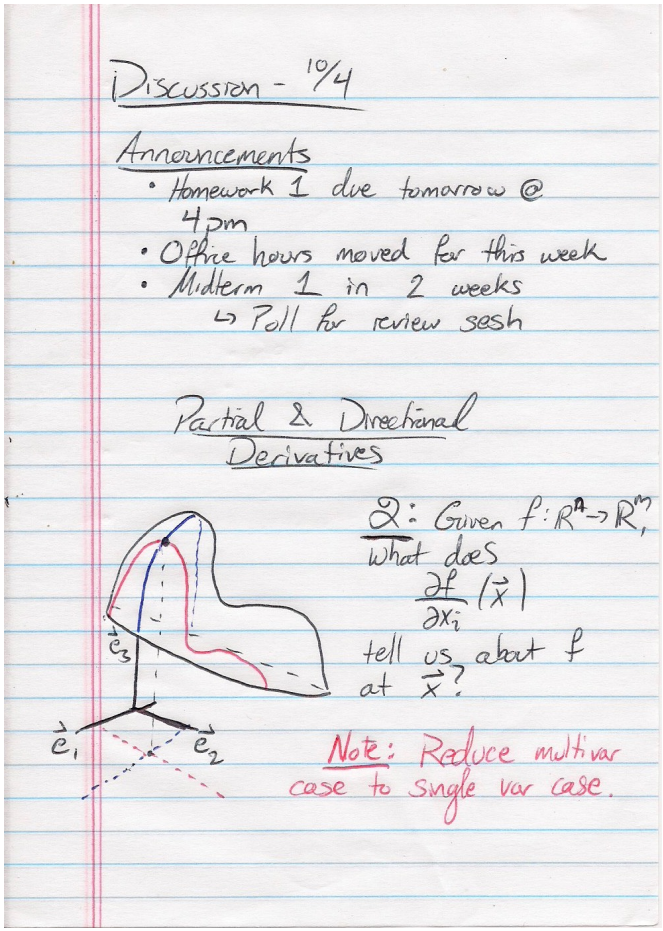

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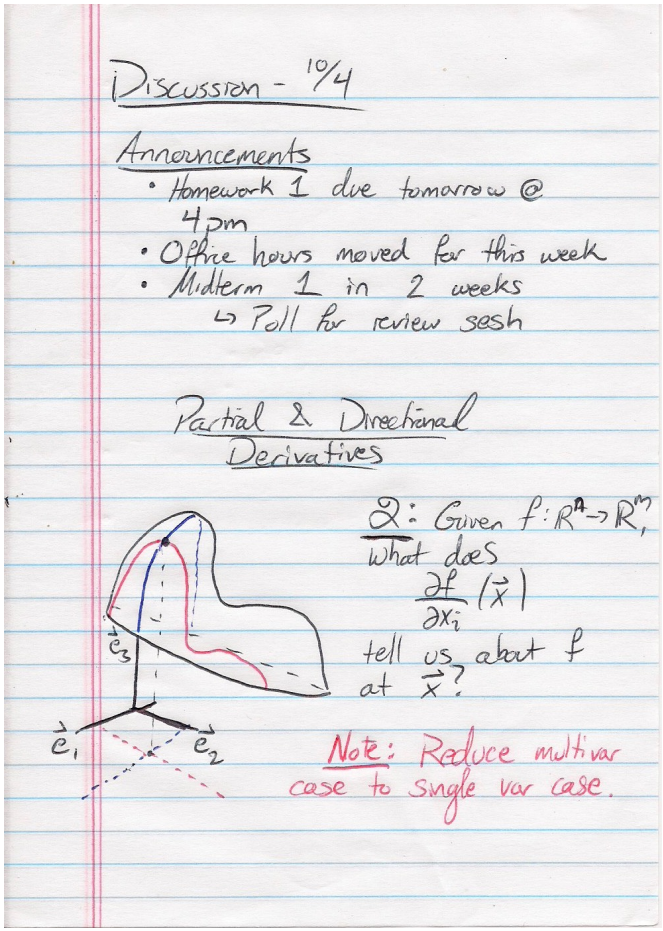
  - **Day of**: Ask students where they want practice.



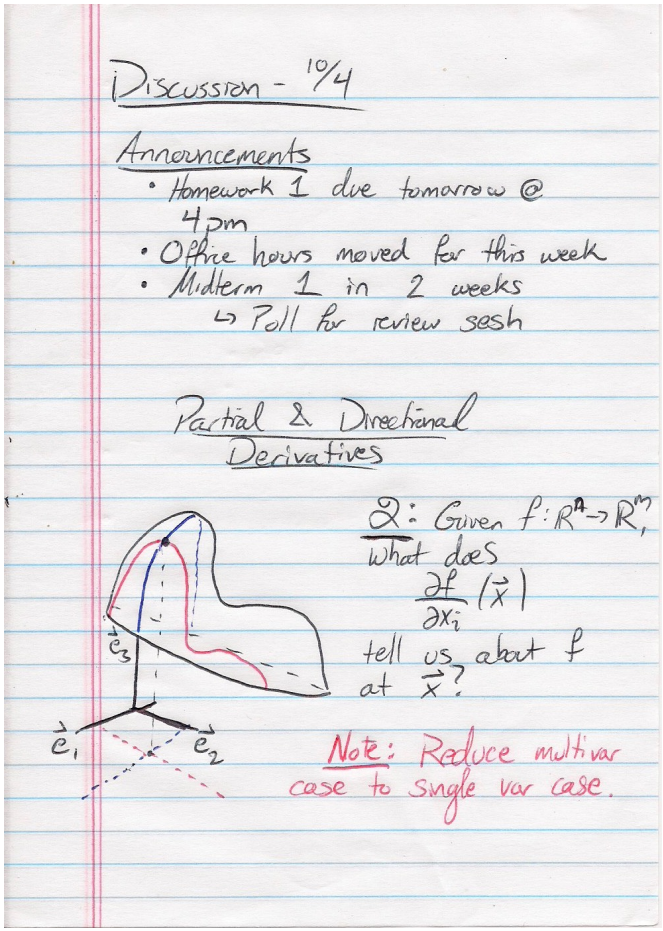
What to do 10 Minutes Before

- Show up 10 minutes early.
- Break the ice.
  - "How was your weekend?"
  - Appropriate joke/pun/story.
  - What problems do you want to work on?
- Write up announcements, office hours, email.
- Relax, smile, take a deep breath.

Figure: xkcd.com

How to Begin a Discussion Section

- Go over announcements.



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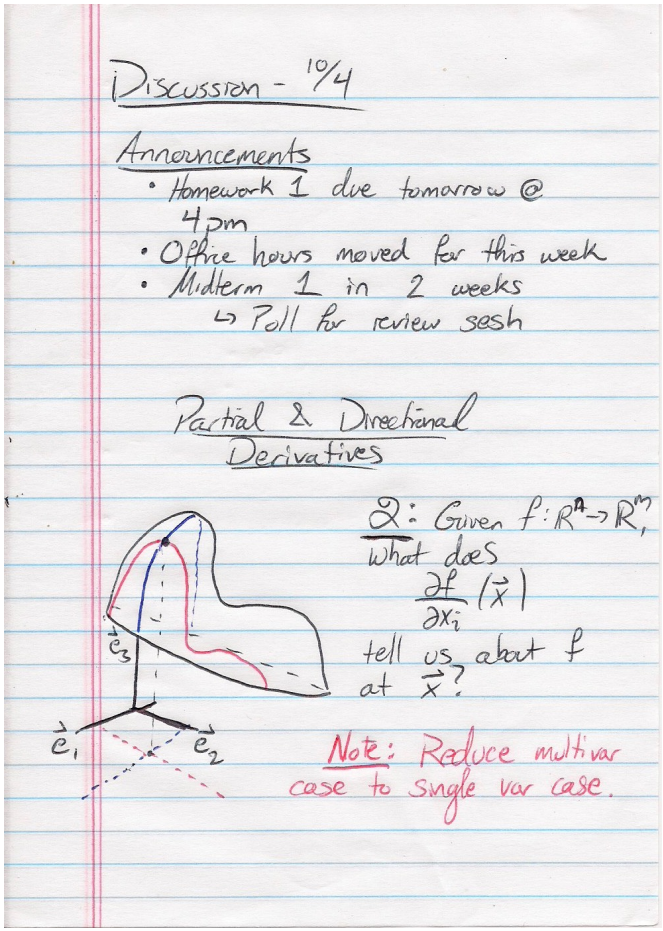

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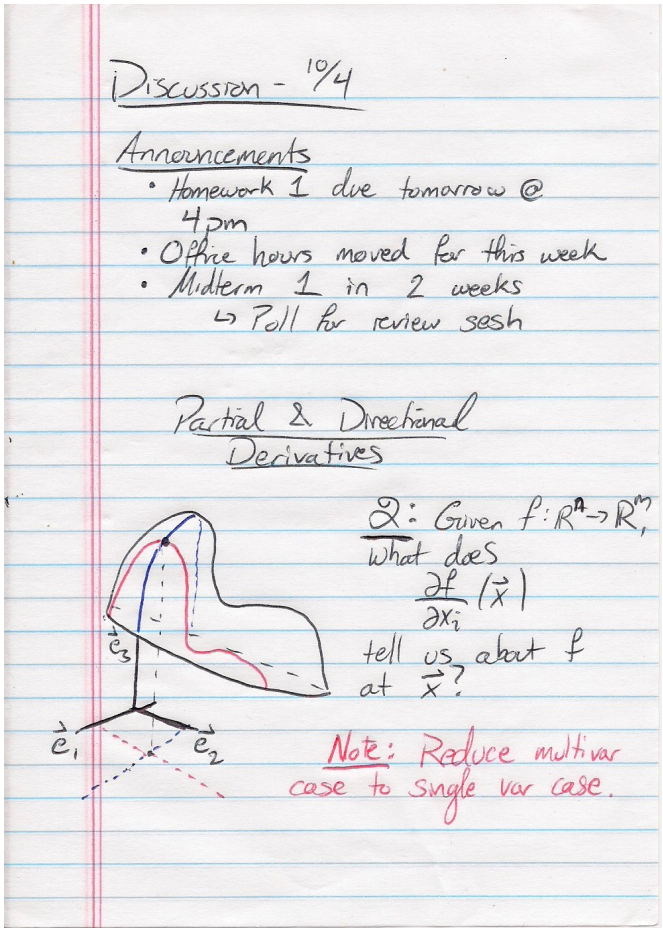

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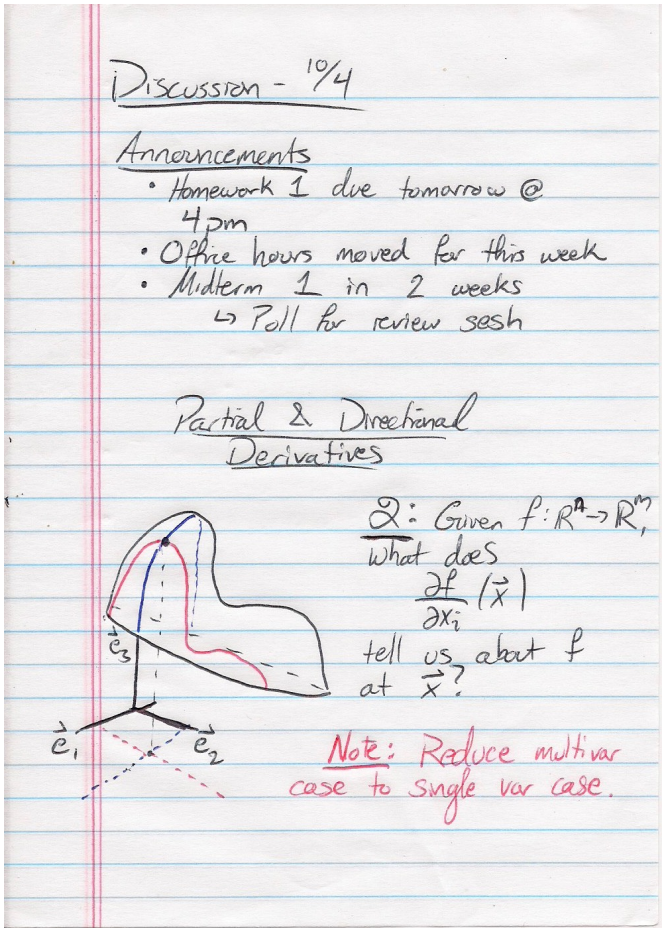

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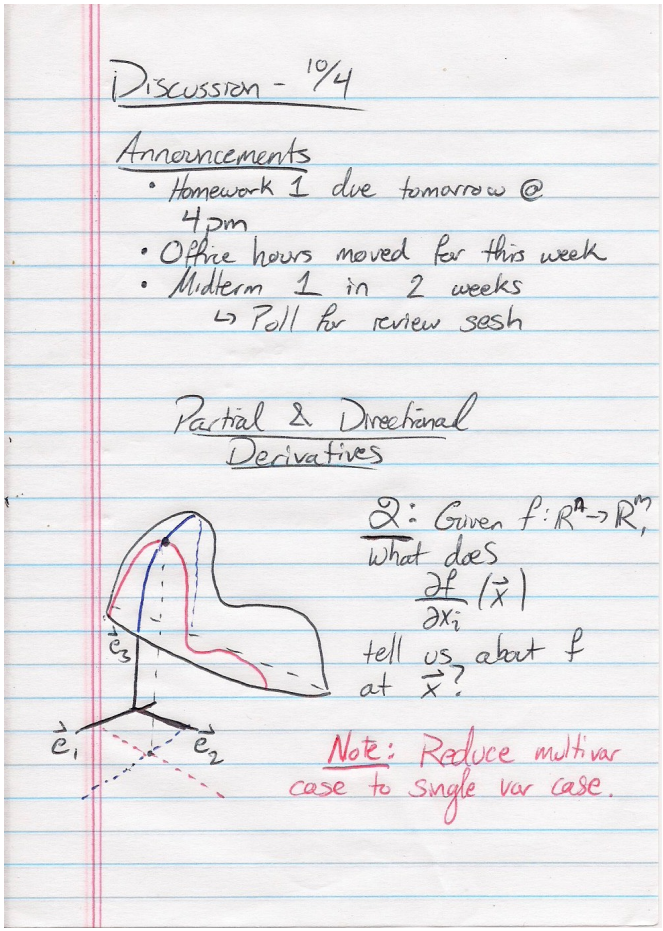

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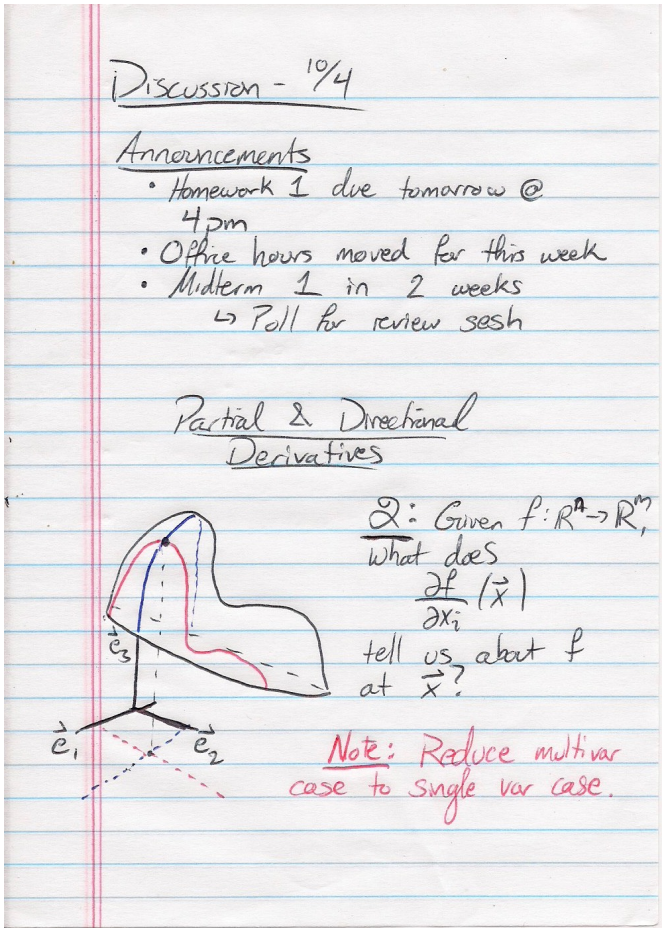
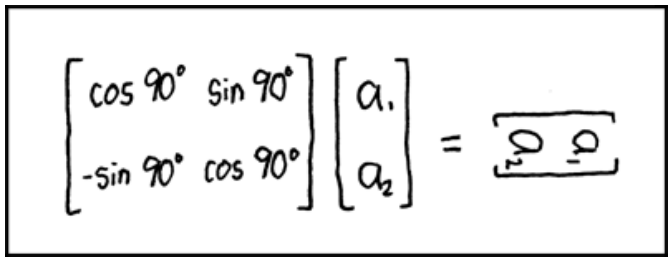
  - Draw (good) pictures.
- Ask questions that test understanding.
- Definitions vs intuition.



MATH 18: A Short Story

Having a basic roadmap to refer to helps contextualize material for students.



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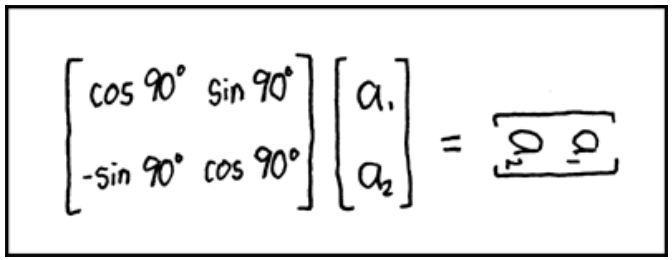

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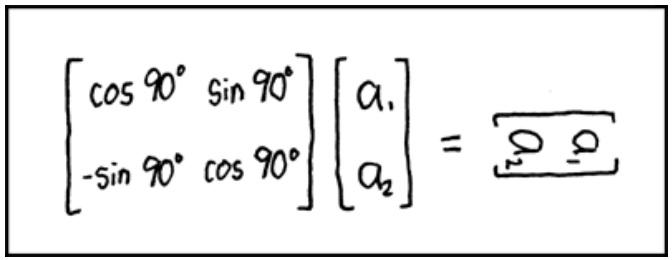

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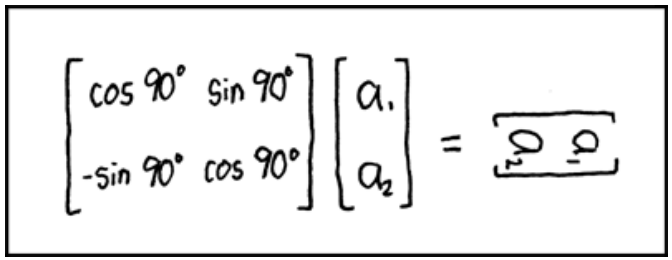

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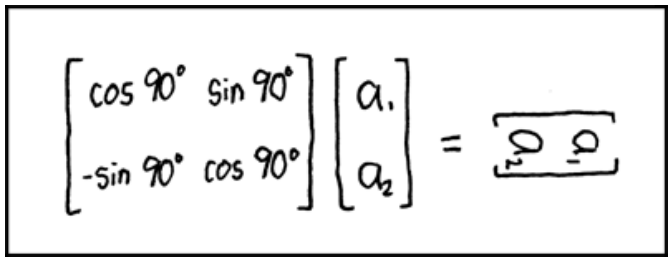
- System of linear equations (Economics, Graphics, Statistics)
  - Be familiar with some applications. Students really appreciate this.
- **Geometry:** What do solutions to $Ax = b$ look like? How do we find them? How many? What is their structure?
- **Algebra:** What properties of matrix A *as a function* inform us about solutions to $Ax = b$?



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What Do Now?

- Let students guide the discussion after the recap.
- Do not be frustrated if you feel students are moving slowly.
  - **Eric's Opinion:** Better that students understand the basics well than rush through all the material.
- Carefully walk through how to interpret a problem (see Dr. Rabin's upcoming slides).
- Some problems only need to be set up. Do not be afraid to delegate the details to the students if you are *very sure* they can understand them. This saves a lot of time.
- Mind your board work. Keep your eye on the clock.

Boardwork

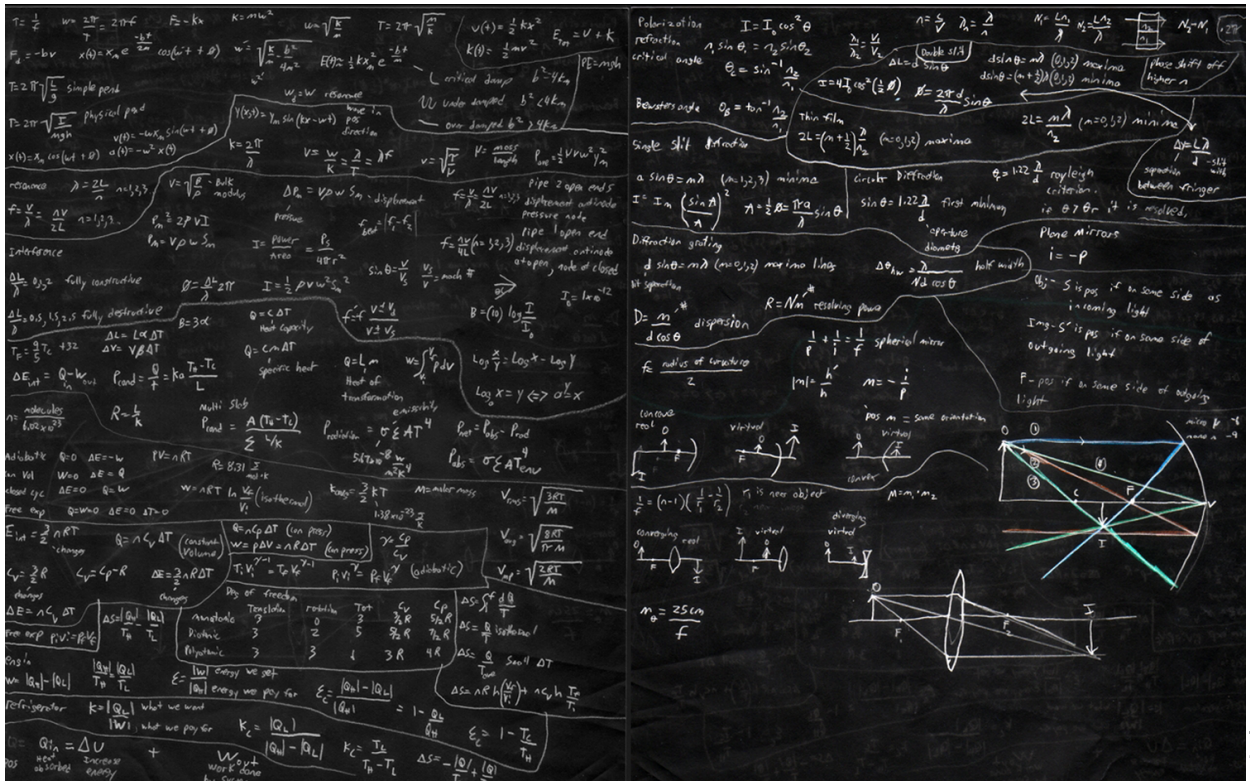 [1]

Figure: An example of poor boardwork.

[1] https://taxfoundation.org/tax-foundation-s-model-results-context/

Boardwork

Good Boardwork

- Neat writing.
- Board is properly partitioned.
- Whole board is being used.
- Not too much, not too little writing.

Bad Boardwork

- Erasing too soon.
- Not labelling problems.
- Standing in front of what was most recently written.
- Poorly spaced work.

Finishing on Time

- Do not keep students long past the when discussion is over. Students do not appreciate this.
- Not every question will be answered during discussion.
- If a discussion is threatening to run long, end with a carefully given hint or a well-posed question.
- Encourage students to come to office hours.

Prof. Rabin's Three Rules of Teaching

1. Everything should be made as simple as possible, but not simpler than that. (–Einstein?)

2. Be enthusiastic about what you are teaching. If you aren't, why would your students be?

3. Hear what you say, see what you write, from students' viewpoint. Would I understand it without the background I have now? What am I assuming without explaining it? Terminology, strategies, context. Use your own undergraduate experience to help you.

Problem Solving, Phase 1: Understanding the Problem

- What do the words in the problem mean?
- What is the situation described? Can I draw a picture?
- What is given and what must be found/proved/done?
- How will I tell when I have found it?
- Do I know an example?
- Do I know a relevant theorem?
- What is my conjecture/prediction of the answer?

Problem-free Activity

- Students may not be engaged with a **mathematical** problem at all, but rather a social one.
- "What do they want me to do?", instead of "what does this mean?"
- They may perform rote procedures in response to perceived triggers.
- "The problem" becomes guessing what is expected, or forcing the situation to fit a known template.

Problem Solving, Phase N+1: Reflection

- How would I recognize such a problem on an exam?
- Why was this problem assigned?
- Can the answer be checked? What does it mean? Does it make sense? Could I have anticipated it?
- How does the answer change if parameters or assumptions vary?
- Are there alternate solution methods?
- What patterns or new questions does the solution suggest?

TA Questions

- "What's the next step?" may not be ideal.
- What does this mean?
- How do we know this?
- What does this computation prove? (Necessary or sufficient condition? For all, or there exists?)
- Is there another way? What would happen if we did this?
- What is the role of this concept (e.g. continuity) in the solution?
- How can we check the answer?
- What if we modify the problem by...?
- What was confusing, and how can we avoid this confusion next time?