Diskmath Study Prep. Event

Hello

- We are: Hannah, Leo, Leo, Shivi and Emil

Disclaimer

We are presenting our tips here.

This is **not** an official lecture / recommendations from the discmath course.

Plan

- Presentations
- Questions
- Short Break
- Kahoot
- (More Questions)

You will get the Kahoot link after the event to revisit it.

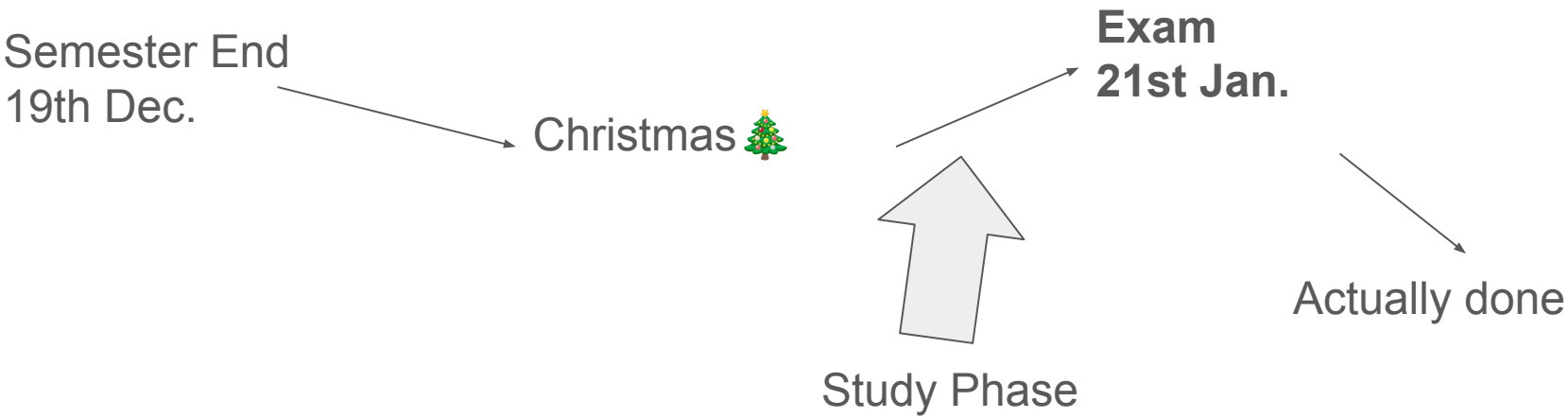
Resources

- THE SCRIPT
- exams.vis.ethz.ch - Collection of old exams and solutions
- vis.ethz.ch/de/services/pvw-scripts/ - PVW Scripts
- discmath.ch
- shivi.io
- emils.site
- Ink-Discord
- (Your favourite LLM)

The Study Phase

You are done with the semester 🎉

But not really…



The Bad News

You are not done yet

The Good News

You still have time to:

- Catch up on topics
- Practice
- Get confident with solving exams

Which is great if the semester was difficult for you so far.

(+ more fun if you like discmath)

Take a Christmas Break!

- An **actual, real** break
- You will come back much more relaxed

What Is Expected From You?

“How do I pass?”

Theory

You should know the important theory.

- Don’t know every detail of RSA? → No problem, you have a cheatsheet
- Don’t know what a group is? → Not good

How to learn this?

Read the script, make summaries, revisit quizzes / kahoots / slides, write down things you didn’t know while solving exams, quiz yourself / friends, learning by doing, write the cheatsheet yourself, …

Techniques

You should know the basic proof techniques.

How do I proof injectivity? Equivalence relation? Countability? Set equality? Induction? Resolution calculus? Function? …

Those are things you can learn by hard! (And should be mechanical.)

Oh, I need to prove that R is an equivalence relation!
→ start with reflexivity, “take any x in X”, show that x R x
→ then symmetry, “take any x, y with x R y”, …

How to learn this? Same as Theory + Lots of practice

Practice and Intuition

Discmath is very proof-heavy, so …

How do I come up with proofs?

The simple answer: **Practice**

- Solve lots of exercises
- Get lots of ideas / intuition / techniques
- Apply similar ideas in the exam to similar problems

The Tricks

The exam also has lots of short questions

- Know your remainder calculation tricks
- Know your eulers totient usecases
- Don’t get fooled by funny empty sets and powersets
- Know your edge-cases and typical counterexamples

How to learn this?

Practice, write down your mistakes, don’t get fooled twice, be curious, question your own proofs

If you

- Know your definitions
- Know your basics
- Know some advanced topics
- Develop routine and practice

Then you should be fine

About The Exam

My Tips

Cheatsheet

Planning Your Study Phase

The Case for a Plan

Think you don’t need one? I did so too.

Spoiler: Having a plan is actually quite nice.

- Overview: What do I still need to learn?
- Fixed time: Makes it easier to start studying
- Less stress
- (You probably won’t follow it anyways)

How to Plan

- Use Excel, Google Sheets, …
- Use template: https://ethz.ch/students/en/counselling/beratung-coaching/tools.html
- Use paper

This is what helped **me** last year, find your own rhythm!

How to Start

- Write down all the topics and how confident you are with them
- Check in every week or so
- How good am I in which subjects? How much time do I need for each?
- Example:

Groups	4	Remainders	3
Relations	5	Res. Calculus	2

How to Start

- Make a grand overview
- Discmath is your first exam, so your first weeks will be discmath-heavy
- Before you start: Do one exam, so you see where you are at
- Example:

Dec Week 4	Start with discmath, exams, revise scripts, make summaries
Jan Week 1	Practice specific exercises, start timed 3h exams, start linalg, revisit summaries
Jan Week 2	Start eprog and aundw, focus on discmath
Jan Week 3	…
…	

Week by Week

- Set a **fixed** start time - makes it easier to start studying
- Do exams when you can focus the best (for me it was in the morning)
- Keep a balance between the subjects
- Keep a balance between high intensity (exams) and reading, untimed exercises
- Plan week by week, see what worked well and what you need to work on

MO	Discmath exam - practice EBNF - code expert
TU	Linalg exam - recap groups - practice group proofs
WE	AnD exam - eprog exam - recap chapter 6, write cheatsheet for it
TH	…

Week by Week

- Take breaks, **real** breaks

Don’t worry, you probably won’t follow your plan exactly anyways.

But having something to do each day and a time when to start is **really** helpful.

How do I learn to come up with proofs?

Discmath is proof heavy

- To get a good grade: Need to consistently come up with proofs
- The good thing: You can practice this

Proofs?

You might have already read a lot of proofs and thought:

Okay, I get it, but **how do I ever come up with that myself?**

There is (as always) mainly one answer:

PRACTICE

My Tips

- Write down all proof techniques / ideas / useful properties you encounter
- Try to use similar things in other exercises
- Develop intuition, draw small examples

When you read through / manage to do a proof, you should really think about "**what property did the proof exploit / what trick did it use?**" → write it down and try to apply similar ideas again.

Examples

- Remainder exercises: -1 trick, eulers totient, …
- Number theory: Case distinction over remainders
- Countability: Prime decomposition, bitstring tricks
- Rings: (0+0), different distributivity order
- Functions: injective, surjective combinations
- Logic: lots of very repetitive proofs

And many more…

Counterexamples

- Have the common ones in mind
- Empty set, 0, 1, small sets, empty function, …
- Take a step back and check if your proof works for those

Proof or disprove → try common counterexamples before starting to prove

How Do I Study?

Solving Practice Exams

- You have lots of exams. (At least the last 10 years are very relevant.)
- Start by doing one, two untimed exams to see how it goes
- Start timing your exams (3 hours) early to get a feeling of time
- But still finish the rest of the exercises
- Always correct them and write down your mistakes
- Also look at the solutions of exercises you couldn’t solve and try to understand them
- Use the pdf version and write on paper
- Solve them alone and discuss them in groups

Questions

Start with doing old or new exams?

Will the exam be similar to the old ones?

Do I need to exactly apply one rule per step in the exam?

When should I write my cheatsheet?

How long should I spend thinking on an exercise before I skip it?

How important is it to write your own cheatsheet?

Should I solve (unsolved) exercise sheets from the semester, or just do exams?

Do I have to put a dot above the arrow?

How formal do I need to be in the exam?