

Algebraic Geometry WS 26/27

How to use RECAP Sheets

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RECAP is a structure for weekly independent study and tutorial preparation. A RECAP sheet is a guide for organizing, testing, and deepening your understanding of the material on your own or with the help of an AI model.



R — Recall

Recall central definitions, constructions, and results before looking them up. The aim is to identify what you can retrieve from memory and where gaps remain.



E — Explore

Investigate examples, counterexamples, and variations. Make predictions, compare related situations, and develop examples of your own. This is where abstract definitions begin to make practical sense.



C — Connect

Understand how concepts and results fit together, imply one another, and depend on one another. Use these connections to develop or reconstruct proofs and arguments.



A — Apply

Apply the material to new problems. This is closest to traditional exercises. The aim is not only to obtain an answer, but to produce a clear and justified mathematical argument.



P — Present

Explain the mathematics in your own words and respond to questions. Present begins in your independent preparation and is completed in the tutorial conversation.

A recommended weekly workflow

You do not have to work through a RECAP sheet in a rigidly linear order. It is often useful to move back and forth between the stages. The following workflow is nevertheless a good starting point.

1. Start with Recall

Try to answer the Recall questions from memory. Do not worry if some answers are incomplete. Mark the points you are unsure about, then check them against the lecture notes and correct your answers.

2. Build intuition through Explore.

Work through the proposed examples and counterexamples. Before calculating, try to predict what should happen. Change assumptions, look for boundary cases, and create examples of your own.

3. Map the logical structure in **Connect**.

Ask which definitions are being used, which result implies which other result, where assumptions enter, and how a proof can be reconstructed from earlier statements. Dependency diagrams, arrows, short summaries, and proof outlines can be more useful here than a polished proof.

4. Make a serious attempt at **Apply**.

Work on the problem before asking for help. Record partial ideas, unsuccessful approaches, and the precise point at which you get stuck. A failed attempt is useful if you understand why it fails. For Apply problems, aim eventually for a complete mathematical argument.

5. Prepare to **Present**.

Close the notes and explain the main ideas aloud. Practise stating definitions accurately, giving examples, reconstructing key steps of arguments, and answering “why?” questions.

The tutorial: completing **Present**

The tasks on the sheet prepare you for a mathematical conversation. The **Present** stage itself takes place in the tutorial.

Students meet with a tutor in a small group to explain ideas and arguments, describe how concepts and results are related, and respond to follow-up questions. The purpose is not to recite a memorized solution, but to make your understanding visible and deepen it through discussion.

The questions listed in the Present section of a sheet are examples. The tutor may ask about any central definition, example, argument, application, or connection from the week’s material.

✓ Before the tutorial

Before the tutorial, you should be able to say:

- I can state the central definitions and results without reading.
- I have worked through representative examples and counterexamples.
- I understand the main logical connections and can outline some easy arguments.
- I have made a serious attempt at the Apply problems.
- I can explain at least the central ideas aloud in my own words.
- I know which points remain unclear and can formulate a precise question.

Optional: Using AI with RECAP

Using AI with RECAP

Using AI is **optional**. It can help you explore examples, test ideas, receive feedback, and ask for hints—but it should not replace your own attempts.

Important: Using AI responsibly

AI tutors can produce convincing but mathematically incorrect arguments, including false proofs. Always check their claims against the lecture notes. Use AI to develop your own understanding, not as a substitute for independent mathematical work. In the tutorials, you must be able to explain and defend the mathematics yourself.

Use only AI services you are permitted to use. Do not upload confidential or personal information.

Recommended: the course-specific RECAP Tutor in uniGPT

Our course-specific **RECAP Tutor** is available in [uniGPT](#). It is configured with the course's current lecture notes, the current RECAP sheet, and instructions for the five RECAP stages. **You do not need to upload the PDFs or paste the tutor prompt below when using this agent.**

1. **Log in to uniGPT.** Sign in to [uniGPT](#) with your University of Münster account **at least once**. The course team cannot grant you access before your first login.
2. **Request access in Learnweb.** In our Learnweb course, open the activity *RECAP Tutor – Request Access* and select the option confirming that you would like access and have already logged in to uniGPT. You do **not** need to enter your email address: we will use the university email address recorded in Learnweb. Access is granted manually, so activation may take some time.
3. **Open the tutor.** Once you have been granted access, use the tutor link in Learnweb or open the [Algebraic Geometry RECAP Tutor](#) directly. *The link alone does not grant access.*
4. Start a **new chat** for the current sheet. You may begin with a RECAP stage, a specific exercise, or a question of your own. For example:

Let's work on Apply, question 2. I have an idea, but I am not sure it works. Can you check my reasoning without giving away the solution?

5. Work **one step at a time**: explain your attempt, respond to the tutor's questions, and ask for another hint only when needed. Try to reconstruct the argument yourself afterwards.

The agent is meant to help you prepare for the human tutorial, not to replace it.

Alternative: use an AI model of your choice

You can also use another AI model as a RECAP tutor. In that case, you need to supply the course material and the tutoring instructions yourself:

1. Start a **new chat** and attach **both PDFs**: the lecture notes **only up to the material covered so far** and the **current RECAP sheet**. **Do not send the message yet.**
2. Copy the **entire tutor prompt** below into the message field. At its end, add a starting request, for example:

Let's start with Recall, question 1. Ask me the question and wait for my answer before giving feedback.

3. Send the **prompt and both PDFs together** as your first message, then work on one task at a time.

The PDFs provide the mathematical content; the prompt tells the model how to work with you. You do not need to upload this guide. If a model cannot handle a long PDF reliably, use the cumulative lecture-note excerpt up to the current week or the relevant pages.

Copyable tutor prompt for your own AI model

Copyable tutor prompt

You are my interactive RECAP tutor for a university course in Algebraic Geometry. Your goal is my independent understanding, not simply to give solutions. Use concise, precise, friendly English.

COURSE MATERIAL

- The uploaded lecture notes are the primary mathematical reference; the attached RECAP sheet provides the current tasks.
- Use only the material covered in the uploaded notes and the prerequisites explicitly assumed there. Do not use later results, advanced shortcuts, or alternative proof methods that bypass the current course material.
- Follow the course's definitions, hypotheses, notation, and methods. If you cannot verify a claim from the materials, say so rather than inventing an argument or citation. Identify relevant passages when helpful.

MATHEMATICAL FEEDBACK

- Check my claims, calculations, and arguments critically before agreeing. If something is incorrect or incomplete, identify the first significant issue and help me understand it.
- If I have guessed the correct result but not proved it, do not supply its proof strategy. Invite me to develop a justification.

TUTORING STYLE

- Act as a tutor, not a solution generator. Begin with an open question or a response to my attempt. Normally ask one question at a time and wait for my answer.
- In Connect and Apply, discovering the proof strategy is part of my work. Asking "How do I prove this?" is not a request for the main proof idea: first ask what I need to show and what I have tried.
- Give hints progressively. Each response should contain **AT MOST ONE** new mathematical idea or strategic direction. Do not reveal

- its consequences and the next step in the same response.
- Do not reveal a generator, substitution, construction, lemma, or other central part of the solution merely to ask me to fill in the remaining calculation.
 - If I remain stuck, offer a more concrete hint rather than repeating unhelpful questions. Give a complete worked solution only after we have discussed my attempt and I explicitly ask.

RECAP MODES

Recall: Quiz me on definitions and results. Let me answer before correcting or completing my response.

Explore: Encourage predictions and my own examples, counterexamples, and variations.

Connect: Help me trace implications and dependencies, and reconstruct proofs without revealing the argument in advance.

Apply: Ask for my approach, diagnose problems, and give only one progressively stronger hint at a time.

Present: Conduct an oral-style tutorial conversation. Ask me to explain ideas in my own words and respond to follow-up questions.

If I specify a task or RECAP stage, begin there. Otherwise, ask what I would like to work on. Never solve the entire sheet unsolicited.

Useful example requests

Instead of simply asking the model to solve an exercise, try requests that encourage you to think:

- **Recall:** *Quiz me on this week's central definitions, one question at a time. Let me answer before you comment.*
- **Explore:** *Help me construct an example of two different ideals with the same zero set, but do not give me the example immediately.*
- **Connect:** *Here is my diagram of dependencies between results. Check it critically and ask me about any missing connection.*
- **Apply:** *Here is my proof attempt. Identify the first serious gap and give me one hint. Wait for my response before continuing.*
- **Present:** *Conduct a short oral tutorial conversation on this week's material. Ask one question at a time and challenge unclear answers.*

When you get stuck

First record what you understand and what you have tried. Say exactly where you are stuck, request **one hint**, and work from that hint before asking for the next. Once you have an argument, ask the tutor to *check it critically* rather than to replace it with a solution.