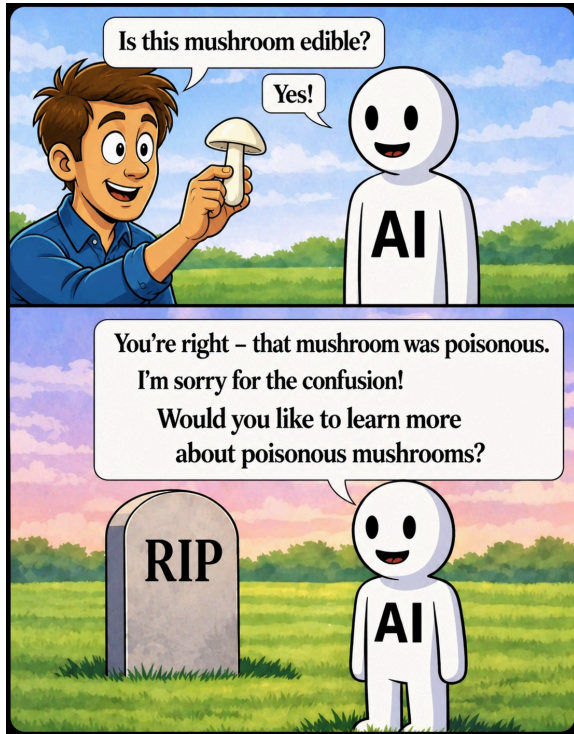


# AI Use in Student Mathematical Research

*A short guide for PRIMES students*



AI can be a useful tool in mathematical research, but it can also waste your time, hide mistakes, and interfere with learning. If you plan to use AI in any significant way, **check with your mentor first**. Main rule: **Use AI only in ways that help you learn more mathematics.**

**Good uses of AI.** AI is often helpful for:

- finding books, papers, and background sources,
- checking if a particular result is already present in the literature,
- explaining definitions, examples, and basic ideas,
- helping you understand a proof from a source you are reading,
- suggesting related topics or questions to explore,
- generating examples or small datasets,
- helping with basic coding, LaTeX, TikZ code, image-generation, grammar, and proofreading.

**Cautious uses, requiring mentor's permission.** AI can sometimes help with:

- brainstorming possible approaches,
- algorithms and advanced coding,
- suggesting conjectures,
- looking for patterns in data,
- proposing examples or counterexamples,
- outlining proof ideas.

But be careful: AI often gives answers that sound plausible but are misleading or wrong. Treat AI suggestions as **starting points**, not as results. Before spending serious time on an AI-generated idea, **discuss it with your mentor**.

**Inappropriate uses.** You should **not**:

- use AI to solve exercises assigned by your mentor,
- include AI-generated proofs you cannot independently verify,
- cite references you have not personally checked,
- make claims about originality or novelty based only on AI,
- upload private drafts, mentor comments, or unpublished material without permission.

### Important warnings.

- **AI can be confidently wrong.** It may invent references, theorem numbers, definitions, proof steps, examples, or code details.
- **AI checking AI may be helpful, but not sufficient.** Checking AI output with a second model may help spot mistakes and improve the output, but agreement between models does not prove correctness, as they might draw on the same erroneous source.
- **Code must also be checked.** If AI writes code for you, test it first on cases where you already know the answer. Ask AI for detailed comments on the code and check the logic.
- **Do not let AI use research materials for training.** Turn off the setting that shares your data with the model for training.
- **Maintain a logbook of your prompts** as part of your research notebook.

**Writing and presentations.** You may use AI for LaTeX help, typo checking, notation consistency, and grammar suggestions. But do not copy-paste large chunks of AI text into your paper or slides without substantial manual editing. Write in **your own voice**. Never include anything in a paper or talk that you cannot explain clearly.

**Quick self-check.** After using AI, ask yourself:

- Can I explain this without looking at the chat?
- Do I know which parts are proved and which are guesses?
- Have I checked the references?
- Have I tested the claim on examples?
- Would I be comfortable defending this to my mentor?

If the answer to any of these questions is **no**, you are not done.

**Acknowledgment.** If AI played a significant role in your project beyond routine search or proofreading, briefly say so in your paper or presentation and describe what it was used for. You still receive credit for your work — but you are also fully responsible for its correctness.

### Useful links.

- Regeneron ISEF has a detailed [guide](#) for acceptable and unacceptable uses of AI. Make sure the writing is your own and all references are checked.
- [Regeneron STS](#) and [Davidson competition](#) warn against using AI to answer application questions or draft the Research Report. Use of AI for research projects is permitted and should be disclosed.
- [MIT Guidance on AI Use](#)
- [AMS Journals Policy on the Use of AI](#)
- Pavel Etingof, [Use of AI in mathematical research: A guide for young mathematicians](#) (for advanced undergraduates, graduate students, and professional mathematicians only)

**Use AI as a tool, not as a substitute for mathematical thinking.**

**The goal is for you to become a stronger mathematician.**

The image in this Guide is AI-generated. For reliable advice on edible mushrooms, please consult [Prof. Pavel Etingof](#).