

Online Resources of the Mathematical Community

Key platforms and best practices

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Slides prepared with assistance from ChatGPT 5.

Plan for today

- Grasp the scope and best use of math sites.
 - For abstracts and reviews: **MathSciNet**, **Zentralblatt**
 - For preprints and papers: **arXiv**
 - For Q&A: **Math StackExchange**, **MathOverflow**
 - For databases: **OEIS**, **GRDB**, **LMFDB**, ...
 - Other community resources.
- Learn how to **export BibTeX** from MathSciNet (or arXiv or Zentralblatt) to build a references file for your project.

BibTeX = L^AT_EX database format for bibliography – see later.

What it is: AMS-curated database of math publications with reviews, journal links, MSC classification, citation links.

MSC = Mathematics Subject Classification, is an alphanumerical classification scheme used by many math journals.

Good for:

- Finding reviewed literature.
- Exploring author profiles.
- Exploring subjects.
- Chaining references (backwards and forwards).
- Exporting BibTeX for your bibliography – see demo.

Institutional access often required off-campus.

What it is: Open database with reviews, links, classification.

- Formerly known as Zentralblatt MATH.
- Edited by the EMS, the Heidelberg Academy of Sciences and Humanities and FIZ (*Fachinformationszentrum*) Karlsruhe.

Good for:

- Similar use and complementary to MathSciNet, but *open*.

Interface and bibliography export differ slightly from MathSciNet.

 *Reviews reflect expert judgment, but do not replace reading the paper.*

Pronounce “archive”.

What it is: Preprint (and postprint) server, moderated but



not peer-reviewed.

Good for:

- Rapid dissemination prior to journal publication.
- Latest results and version history.
- Daily alerts for preprints in subscribed categories.
- BibT_EX entries – cite appropriately!
 - Look for the latest version.
 - When published, cite the journal version.

Intermezzo: BibT_EX

BibT_EX = a database format + tools to cite automatically

MathSciNet and other reference sites allow to export in BibT_EX format.

How to use:

- Collect your references in **BibT_EX format** in a .bib file,
for instance myrefs.bib.
- Put that file in your Overleaf project,
add `\bibliography{myrefs}` in your main .tex file,
and recompile.

Next lecture: How to cite the references in the main file.

Typical BibT_EXentry

```
@article {AtiyahBott,  
  AUTHOR = {Atiyah, Michael F. and Bott, Raoul},  
  TITLE = {The moment map and equivariant cohomology},  
  JOURNAL = {Topology},  
  FJOURNAL = {Topology. An International Journal of Mathematics},  
  VOLUME = {23},  
  YEAR = {1984},  
  NUMBER = {1},  
  PAGES = {1--28},  
  ISSN = {0040-9383},  
  MRCLASS = {58F05 (55N91 57R20 57R22)},  
  MRNUMBER = {721448},  
  MRREVIEWER = {G.\ J.\ Heckman},  
  DOI = {10.1016/0040-9383(84)90021-1},  
  URL = {https://doi.org/10.1016/0040-9383(84)90021-1},  
}
```

DOI = digital object identifier

Live demo: MathSciNet → Overleaf

Old release:

The screenshot shows the old MathSciNet search interface. At the top, there is a navigation bar with links: Clipboard, Home, Preferences, Free Tools, About, Librarians, Reviewers, Terms of Use, and Blog. The MathSciNet logo is on the left, and the ETH-Zentrum logo is on the right. Below the navigation bar, there are tabs for Publications, Authors, Journals, and Citations. The Publications tab is selected. The main search area has a 'Search Terms' section with four dropdown menus: Author, Title, MSC Primary, and Anywhere. Each dropdown menu has a corresponding text input field and a dropdown arrow. To the right of the search terms is a 'NEW!' banner with the text 'Author Profile Personalization Read More'. Below the search terms are three sections: 'Time Frame' with radio buttons for 'Entire Database' and 'Year' (with a year range input), 'Publication Type' with radio buttons for 'All', 'Books', 'Journals', and 'Proceedings', and 'Review Format' with radio buttons for 'PDF' and 'HTML'. At the bottom of the search area are 'Search' and 'Clear' buttons. A footer bar contains the text 'Facts and Figures: 4,541,972 total publications' and links for 'Help' and 'Contact Us'.

New release:

The screenshot shows the new MathSciNet search interface. At the top, there is a navigation bar with links: Home, Resources, Reviewers, Free Tools, Support, and Help Pages. The MathSciNet logo is on the left, and the ETH-Zentrum logo is on the right. Below the navigation bar, there are tabs for Publications, Authors, Journals, Series, and Search MSC. The Publications tab is selected. The main search area has a large search input field with a magnifying glass icon. To the right of the search input field are buttons for 'x', 'Show Classic Interface', and 'Show All Fields'. Below the search input field are links for 'Recent Searches' and 'Pinned Searches'.

Math StackExchange (MSE) vs. MathOverflow (MO)

MSE: broad audience, all levels; great for teaching questions, concrete examples, \LaTeX questions.

MO: research-level Q&A; appropriate for literature pointers, expert clarifications, open problems.

Etiquette:

- Search first; do not abuse.
- Use clear mathematical statements and \LaTeX .
- Observe community norms.

OEIS — Online Encyclopedia of Integer Sequences

What it is: Curated database of integer sequences with references, formulas, links.

Use to:

- Identify a mysterious sequence from first terms.
- Find literature, recurrences, generating functions.

Cite the specific OEIS entry ID, e.g., A000045 (stands for Fibonacci).

Some other online databases

LMFDB — L-Functions and Modular Forms Database

Number theory: L-functions, elliptic curves, modular forms, Galois reps, . . .

GRDB — Graded Ring Database

Algebraic geometry: Fano manifolds, graded rings, etc.

π -Base — Topology counterexamples

Topology: searchable repository of classic counterexamples.

Etc

Also open source tools – see our course website.

👉 Check licenses and sites' "how to cite" instructions.

Mathematics Genealogy Project:

- Track advisor/advisee lineages.
- Check thesis titles, years and institutions.

MacTutor (St Andrews):

- Find biographies and timelines.
- Contextualize citations with thematic articles.

Useful for acknowledgements, historical notes, and course enrichment.

- Read beyond abstracts; verify claims and hypotheses.
- Distinguish *preprint* from *published* when citing.
- When submitting reviews, be precise and constructive.
- On Q&A sites: provide minimal examples, cite sources, and follow posting guidelines.

Homework for 8/Oct – Paper 1

- Counts one point for Pass/Fail.
- Upload PDF on Moodle preferably before next lecture.
- Follow guidelines on course webpage.
- Deadline: Wedn 8/Oct 22:00, however...
- Moodle maintenance Wedn 8/Oct 18:00-20:00.
- **NEW:** you may use AI for a first personal revision.

Homework for 15/Oct only possible starting 9/Oct.