

The research/writing/dissemination process

UNIVERSITY
OF OSLO

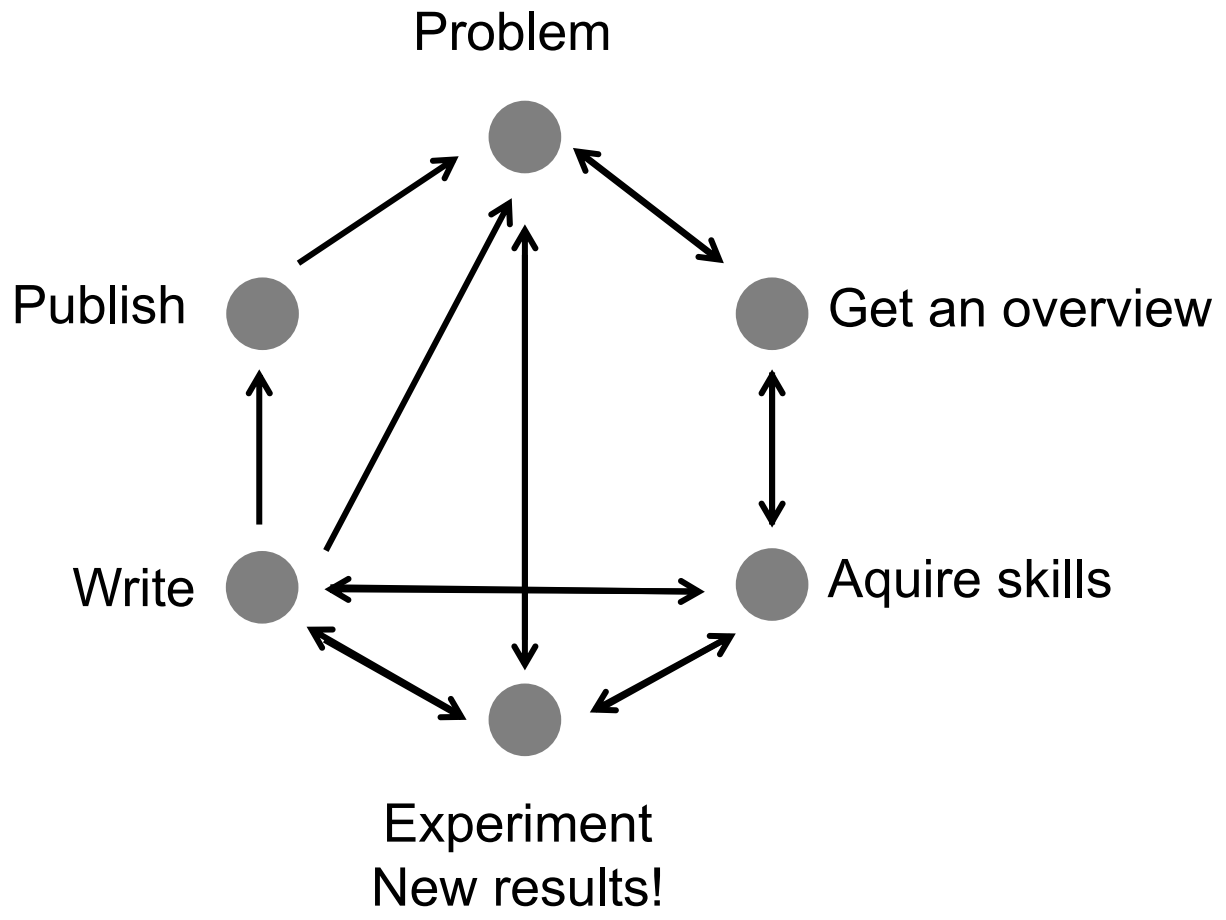
Research in mathematics I

- Solve a problem
- Build a theory
- Prove a theorem
- Construct examples or counterexamples
- Tweak assumptions / situations
- Simulations
- Analyzing data
- Combinations
- Writing and re-writing
- Very different from coursework



Research in mathematics II

Post manuscript on arXiv.org
Submit to journal
Review process (scientific insurance)
Accepted version on arXiv and DUO
Published version in journal

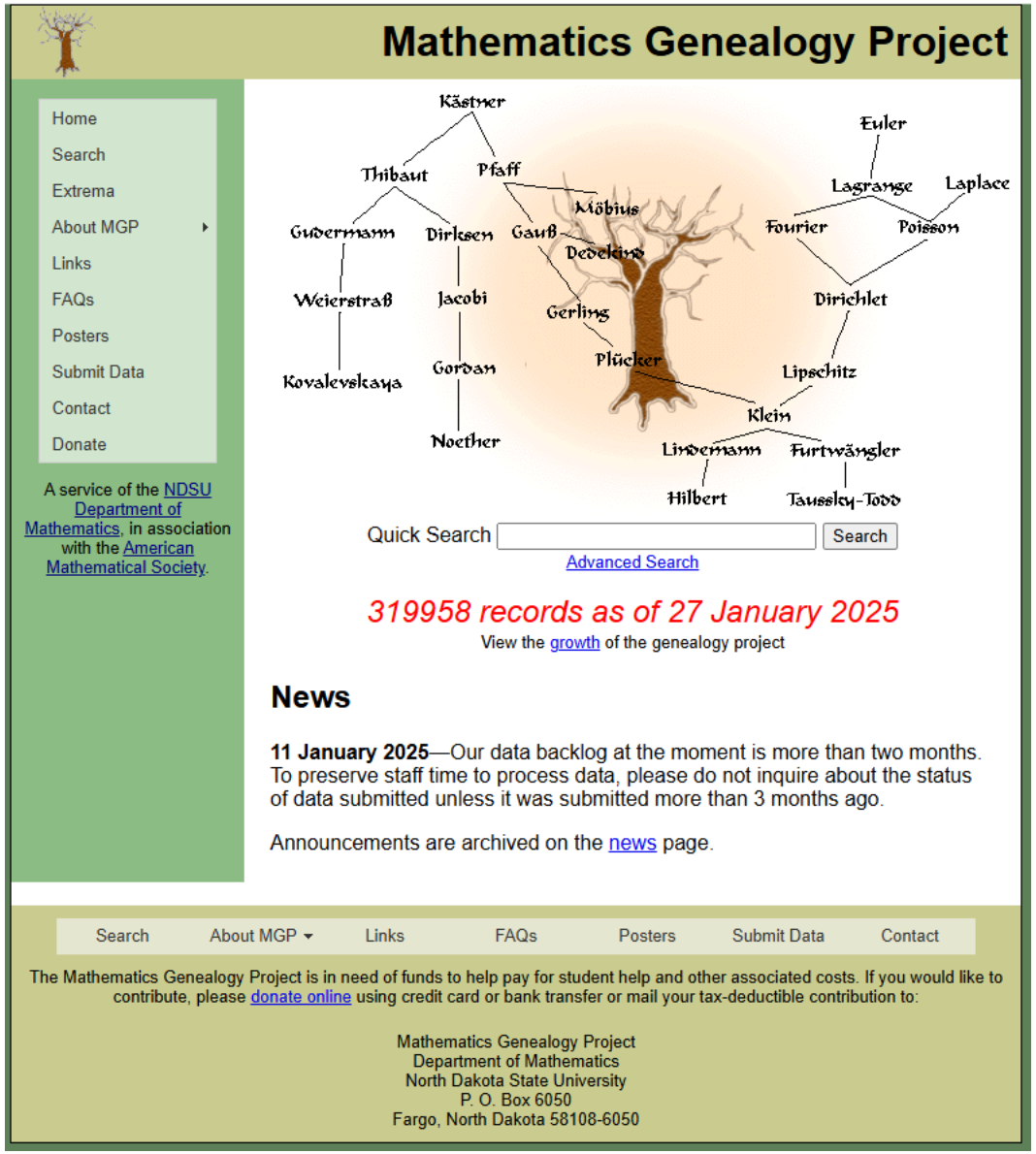


The publishing process 101

- Do great research
- Write results in a manuscript
- Publish pre-print in subject archive: www.arxiv.org
- Submit to journal for peer review – critical review by other experts
- Publish article in renowned journal (published version)
  - Norwegian register for scientific journals (NSD)
- Publish post-print (peer reviewed, but without journal's formatting) in institutional repository: www.duo.uio.no
- Update subject archive with post-print version
- Get review in database: MathSciNet, zbMATH
- Get noticed as a researcher: citations, h-index, collaborations, seminars, conferences

The research community

- Research groups and networks
  - International collaboration
  - Professors, postdocs, graduate students (check out Math Genealogy Project)
  - Communicate via e-mail, message boards, mailing lists
  - Meet at conferences or invited visits
  - Present talks and **posters**
- Publish and review articles
  - **Peer reviewed** = scientific
  - Preprint servers (www.arxiv.org)
  - Scientific databases (MathSciNet)



Research process for your project

- Starting points
  - Problem/subject area (examples, theory or data)
  - An article or pre-print
  - Topic or theorem
- Your tasks could be
  - Get an overview over literature
  - Understand situation, theorems, examples and context
  - Reproduce proofs and examples
  - Generate new examples, simulations, data, code
  - Conclude from new examples
  - Connect your results to known literature
- Product
  - The written project (article in scientific journal)
  - The poster/oral presentation (talks for other mathematicians)



You as a researcher I

- Network
  - Supervisor
  - Fellow students
  - Research(ers) your project builds on
- Knowledge of the research process
  - Where do I find open problems?
  - How do I attack the problems?
  - Where do I find literature to support my research?
  - What kind of data do I have?
  - How do I use and share data?
  - Writing and communicating
  - The publishing process (and industry)





Keeping track of research

Building research in 3D

- A blank notebook that you can bring with you everywhere
  - For your own thought experiments
  - For working through proofs from the literature
  - Transcribe important ideas/summaries
- A binder with your examples or experiments presented systematically and in your best hand writing
- A set of colored pens, highlighter, post its
- Print important articles, keep them in a folder with clean notes
- Borrow background books from the library
- Write, rewrite and learn from writing



Building research with technology

- An iPad or similar for notes
- A laptop for your data and text
- A reference manager like Zotero
- Plan and work with your data systematically
  - Folder structure
  - File naming/dating and version control
  - Backups!
- NB! Do NOT copy and paste anything to your draft without proper citation
- NB! Do NOT use AI to generate text or essential code
- NB! You have YELLOW DATA



Student work is at least YELLOW

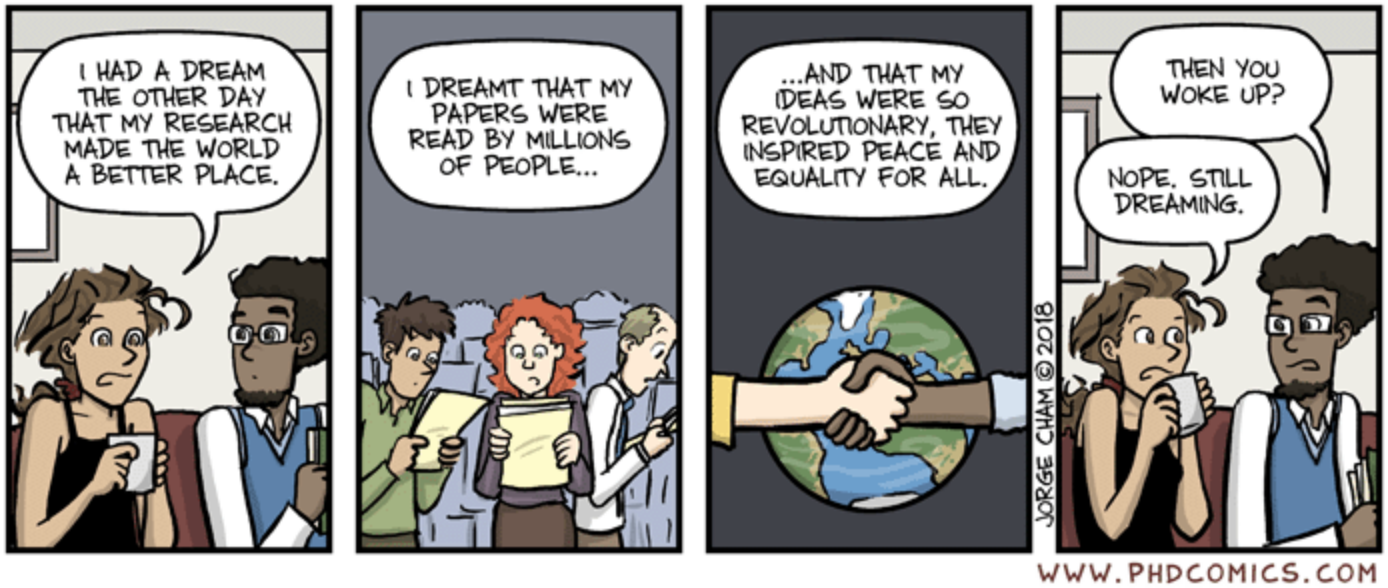
- https://www.uio.no/english/services/it/security/lsis/storage-guide.html
- As a general rule, yellow data is not allowed on your private laptops or computers
- However, some limited use is accepted if you comply with the guidelines for using private computers
- https://www.uio.no/english/services/it/security/lsis/private-computer.html
- Only encrypted devices
- Only UiO e-mail
- Ask your supervisor about your data
- Send an e-mail to drift@math.uio.no



You as a researcher

- Find focus
  - Inspirational drawings, results and tips on the wall in front of you
  - Motivational music
  - 90 minutes work - 30 minutes break
  - Put away phone and distractions
  - Don’t force it!
- Take care of yourself
  - Physical health, walks and workouts
  - Food and coffee and chocolate
  - Sleep
  - Spend time with family and friends
  - Mental health (Worry, imposter syndrome)
  - Hang in there and seek help!
- Take care of your fellow students!!!




I HAD A DREAM THE OTHER DAY THAT MY RESEARCH MADE THE WORLD A BETTER PLACE.
I DREAMT THAT MY PAPERS WERE READ BY MILLIONS OF PEOPLE...
...AND THAT MY IDEAS WERE SO REVOLUTIONARY, THEY INSPIRED PEACE AND EQUALITY FOR ALL.
THEN YOU WOKE UP?
NOPE. STILL DREAMING.
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You as a writer

- Write often and not just for your final project!
- Write to yourself before you started the project
- Remember the writing resources
- Show your writing to a friend
- Show your writing to your supervisor
- Read your writing
- Find your voice!

Terence Tao on Voice

Reasons to duplicate or quote:

- To make a historical point
- The result is in an obsure or difficult to find paper
- The form of the argument is motivational for things to come
- The existing paper you are replicating could be modernized, simplified, or updated
- You are writing for a different audience

Avoid duplicating when:

- It is plagiarism, padding, or laziness
- Copying or adapting a piece of text that you do not fully understand
- The work you are duplicating is out of date or not relevant
- Excessive use of quotation from famous mathematicians “name dropping”
- You become a parrot

https://terrytao.wordpress.com/advice-on-writing-papers/write-in-your-own-voice/