

Mathematical sciences resources

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(Bibliographic database material due to **Dugald Duncan**, Heriot-Watt University)

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1. Mathematical writing

Resources

- **Handbook of Writing for the Mathematical Sciences** Nicholas J Higham (SIAM, 1998 – available from www.siam.org and follow link to “books”)
 - Also contains info on writing and giving a talk; preparing a poster; the publishing process; writing English as a foreign language ...
 - Every mathematician should own a copy!
- **Learning L^AT_EX** David F Griffiths & Desmond J Higham (SIAM 1997)
- Your department may have useful material (e.g. L^AT_EX template for posters)
-  University “staff development” courses.
- Newspaper/magazine style guides (e.g. www.guardian.co.uk/styleguide)

Ask yourself some questions

WHY are you writing?

- So as many people as possible can see my fantastic results
- I'm doing a PhD and have to produce a progress report/thesis
- Because my supervisor told me to
- I want to write a lot of papers to get a good job/promotion/well-known
- To publicise what I do to non-specialists (PUS)

WHO are you writing for?

- As many people as possible in my research area
- My examiners (external + internal + maybe supervisor)
- A general non-specialist audience

Keep the **WHY** and the **WHO FOR** in mind as you write

Plagiarism

- Plagiarism is the act of presenting borrowed *words* or *ideas* as your own.
- **It is a major academic sin** (Higham, 1998).
- Self plagiarism is no less a sin.
- Simply changing a few words may not prevent it from being plagiarism.
- **Always** acknowledge the source of **ideas**, and either paraphrase **words** or give them exactly in quotes.
- If you are not sure, then ask.

2. Learned and professional societies

Learned and professional societies

- Edinburgh Mathematical Society (EMS)
- Institute for Mathematics and its Applications (IMA)
- London Mathematical Society (LMS)
- Operational Research Society (ORS)
- Royal Statistical Society (RSS)
- SIAM (Society for Industrial and Applied Mathematics) UK & Ireland section
- European Mathematical Society (EMS)
- Many others . . .

Typical activities

- **Publish** journals, book series
- Hold **meetings**
- Hold or commission **conferences**, workshops
- Professional accreditation, **charter status** (degree courses or individuals)
- **Grant schemes** (for visitors, conferences, research ...)
- Work with government and funding bodies – **raise profile**
- Many have free/reduced membership for PG students
- ...

Edinburgh Mathematical Society (EMS)

- **Aims:** The promotion and extension of the Mathematical Sciences, pure and applied, particularly in Scotland
- Established in 1883; has approx. 500 members (free PG membership); www.ems.ac.uk
- 8 meetings per year (3 in Edinburgh, 5 around Scotland). Next meeting: **Fri 16 Oct (at ICMS)**
- Annual **postgraduate meeting** at the Burn House, Edzell (usually in May/June)



3. Bibliographic databases... ...or how to find/organise information

Use the WWW + Google

Search engine `www.google.co.uk` or `www.google.com` is very powerful

- Search on `Euler` returns 14,100,000 hits (2014 = 15,600,000)
- `Euler's method` returns 302,000 hits (2014 = 560,000) hits
- `"Euler's method"` returns 140,000 hits (2014 = 150,000) hits

and at least some of the first few seem sensible

- The search on `Euler's method` means look for pages with both of these words separately or together and in any order anywhere in the page
- The search on `"Euler's method"` means look for pages with that exact phrase

!!! DBD has checked these numbers each year – some go up and down and others keep going up

Google

- Yet more control:

- `"Euler's method" kangaroo` returns 665 (966) hits
- `"Euler's method" kangaroo murderer` returns 298 (222) hits
- `"Euler's method" kangaroo -murderer` returns 660 (584) hits
- `"Euler's method" "kangaroo murderer"` returns 0 hits

- The minus sign tells Google to search on pages without the word following it
- Can also use the advanced search page

! Hit counts can be inconsistent

!!! There are large numbers of bizarre web pages


- **Google Scholar** searches make it easier to focus on academic articles:

`"Euler's method" kangaroo` returns 3 (3) hits

Mathematical “Encyclopedias”

- Mathematical software often has a built in help system that gives background information and references on the methods they use as well as definitions of special functions etc. – *use it as an encyclopedia*
 - Mathematica information is available free on the web at mathworld.wolfram.com
 - Maple has some information on line, but seems to give more running the package itself
- The recently published *NIST Handbook of Mathematical Functions* is available as a book, CD-Rom and online at <http://dlmf.nist.gov/>
 - It is a wonderful resource to find out about the properties of functions you have never heard of before
 - Updates the old 1964 standard by *Abramowitz and Stegun*
- **History of maths.** The St Andrews *MacTutor History of Mathematics Archive* is excellent – search on to find it and other sites

Web Archives - free to users

- The more or less global e-print service **ArXiv** was developed by Cornell University
 - It covers many areas of maths, physics, computer science and quantitative biology
 - Find it at www.arxiv.org and other mirror sites
 - It has its own quite flexible search facility
-  Not peer reviewed
- Its coverage is excellent in some areas. It is less good in others – but use is growing across the mathematical sciences

Commercial Databases



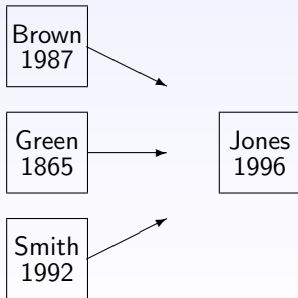
Subscription only. Check with your library

- ISI (Thomson Reuters) Web of Knowledge
 - AMS MathSciNet (Mathematical Reviews)
 - Zentralblatt MATH
-
- Title, author, keyword, date, address searches
 - Output is a subset of
 - full publication details
 - author address
 - abstract or review
 - list of references made by the paper
 - list of papers which refer to the paper being considered
 - link to details of papers by same authors
 - web links to journal articles

Citations and the Flow of Ideas

- Imagine that you have the paper by Jones from 1996
- At the end of the paper there will be a list of references (citations) that tells you where the methods, previous useful results and ideas for the paper came from
- This information can be useful to you. Does not need a database

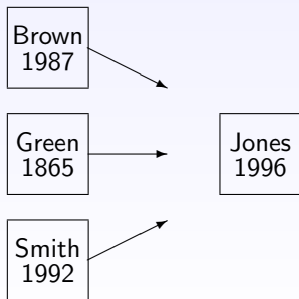
In Jones 1996



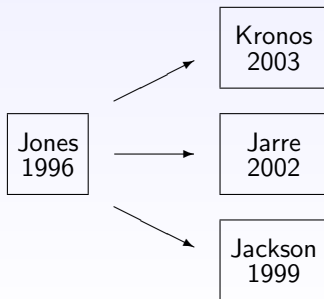
Citations and the Flow of Ideas

- Who has used or developed the ideas in Jones 1996 further?
- I.e. who may be working on the same problem as you?
- Your copy of Jones 1996 will not tell you that, but a **citation database** will

In Jones 1996



In database




Organise your references

I've got a hard disk full of downloads and lists of papers, what do I do?

- Nick Higham's book discusses the **BiBTeX bibliography database** for \LaTeX
[Note: Database = a file that stores information in an organised way]
- **Bibliography manager software**, e.g.
 - EndNote – commercial, check for university site license
 - JabRef – `jabref.sourceforge.net` – free, multi-platform
 - Zotero – `www.zotero.org`
 - Mendeley – `www.mendeley.com` – free, multi-platform
– *reads a directory of PDFs and automatically makes a list etc*

Some of them can also read and output BiBTeX files

- **Card-index box file?** Details and summary of one paper per card
- **Piling system?** – dump everything into a heap and hope for the best

 **DON'T** put information into a database unless you are sure you can get it out again...

Summary

- There are lots of ways to find mathematical information
- Powerful computer tools make searching easier
- Careful design of a search for information makes sense, but luck and lateral thinking can play a positive part too. Keep a broad mind and look around: you might find the answers before the questions – and they might come from an apparently unrelated subject area
- Ask for advice from your supervisor, but bear in mind that people are sometimes slow to adopt new tools
- Your library may be able to help
- Discuss mechanisms with higher year PhD students or postdocs
- Organise your references in a sensible way – **now is a good time to plan ahead for what you need as your project/career develops**