Writing and publishing research in mathematics

Heiko Gimperlein
h.gimperlein@hw.ac.uk

Heriot-Watt University

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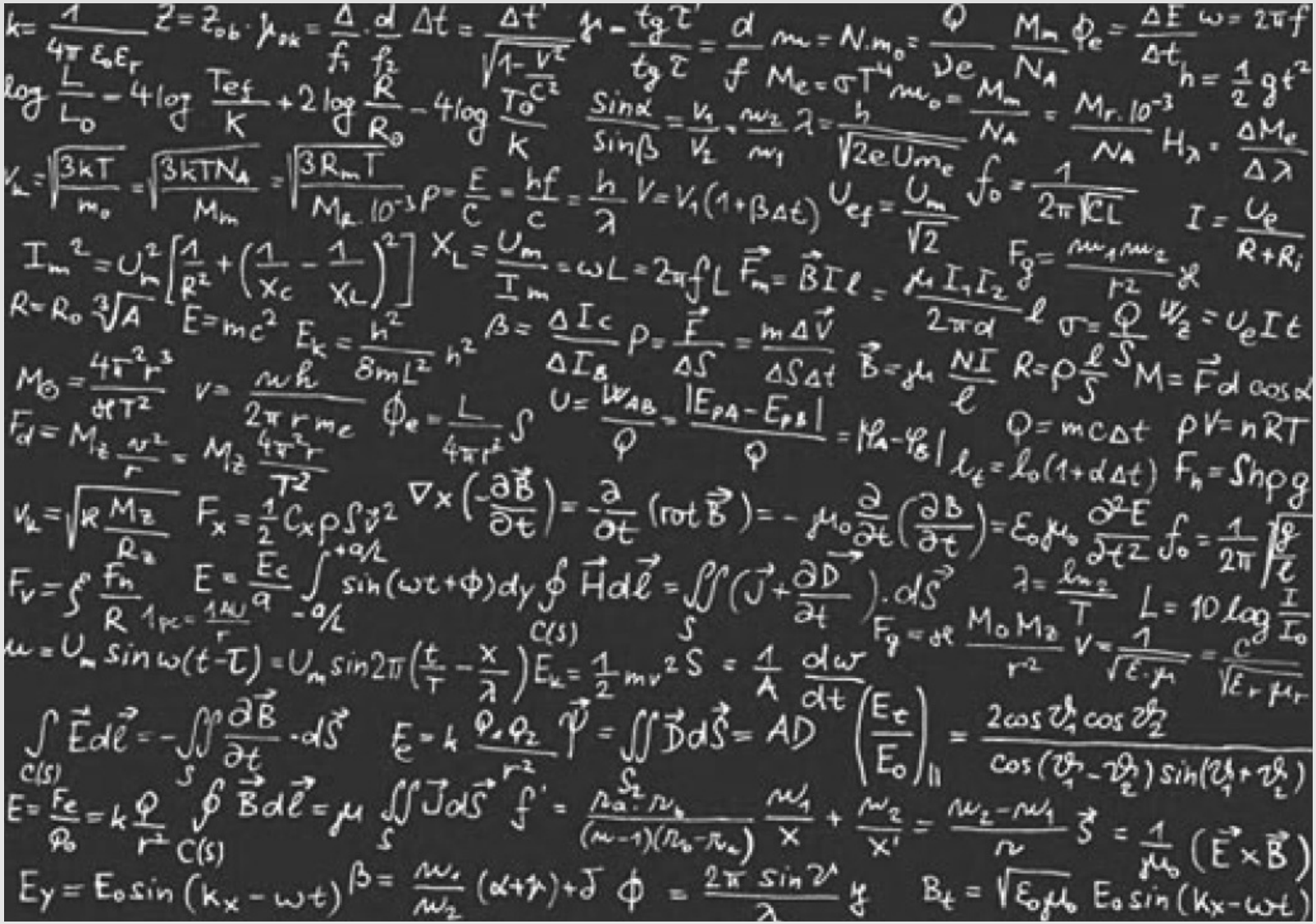
Problem solved



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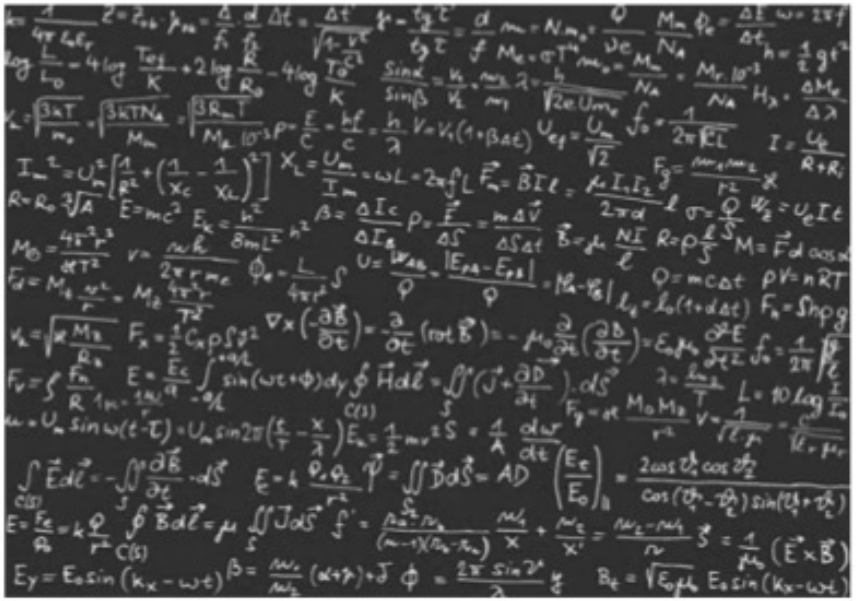
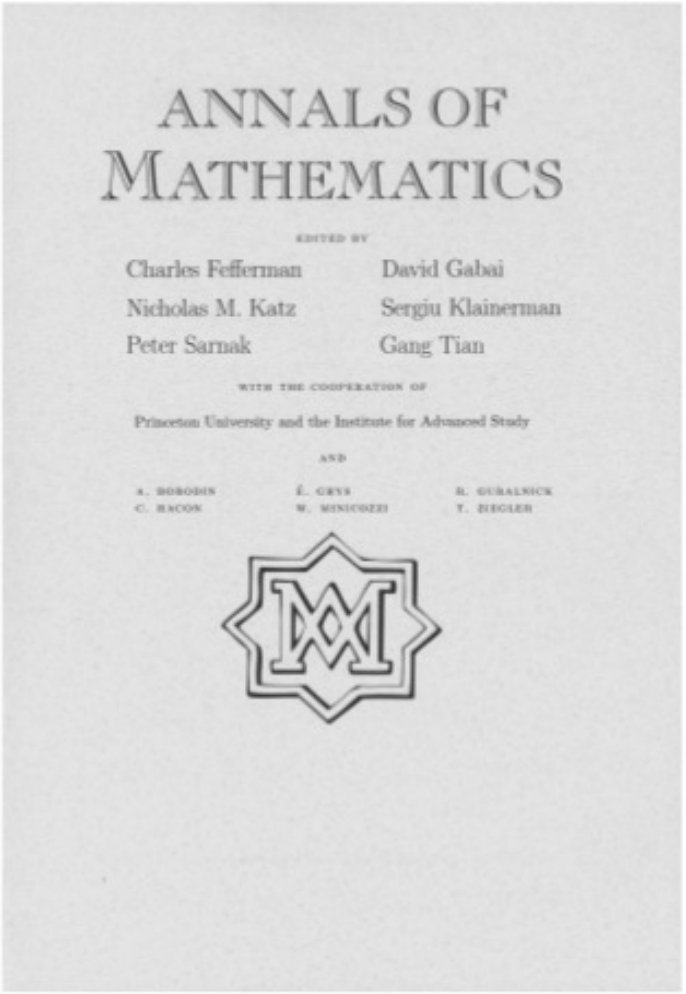
What now?




ANNALS OF
MATHEMATICS
EDITED BY
Charles Fefferman
David Gabai
Nicholas M. Katz
Sergiu Klainerman
Peter Sarnak
Gang Tian
WITH THE COOPERATION OF
Princeton University and the Institute for Advanced Study
AND

Writing and publishing research

- Why?
- How to write mathematics badly?
- Where?

Writing and publishing

- Why?
- How to write mathematics badly?
- Where?

Why write?

- to communicate ideas
- to record results for the long term
  (because they are interesting or to get Ph.D.)
- to claim credit or priority for your work
  (published results $\rightsquigarrow$ recognition and academic jobs)
- to look busy / my supervisor told me to

Why write? For whom?

- to communicate ideas
  within research area, sometimes beyond or the public
- to record results for the long term
  current and future mathematicians, Ph.D. examiners
- to claim credit or priority for your work
  within research area and beyond
- to look busy / my supervisor told me to
  ???

Write down what you've done

Write for **yourself**.

- you come across a neat trick or argument and think it is clear
  $\rightsquigarrow$ write it down – 6 months later when you actually need it, and it might no longer be clear.
- makes argument permanently available to you and may eventually be helpful in your later research papers, lecture notes, teaching.
- gives you practice in mathematical writing (TeXnical & exposition).
- tests whether you have understood the argument on more than superficial level.
- frees up mental space – you can forget the argument.

also useful for incomplete (or unsatisfactory) arguments that you are working on or are about to abandon.

Writing and publishing

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How to write mathematics badly?

In mathematics the gold standard to communicate and record concrete results within a research area is still the **peer-reviewed journal paper**. The format of research papers varies significantly from area to area.

(Most Ph.D. theses only read by examiners? Notable exceptions exist.)

Good exposition crucial for colleagues to understand, trust and use your results. Maybe by telling you some examples of the opposite, you might manage to do better.

How to write mathematics badly?

How to write mathematics badly?

Title of paper: A proof of a theorem of Macdonald.

(inspired by J.P. Serre)

How to write mathematics badly?

Title of paper: A proof of a theorem of Smith.

(inspired by J.P. Serre)

How to write mathematics badly?

Title of paper: A proof of a theorem of Euler.

(inspired by J.P. Serre)

How to write mathematics badly?

Title of paper: A proof of a theorem of Euler.

Main Theorem: An fpph AP is regular.

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How to write mathematics badly?

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Main Theorem: An fppf AP is regular.

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How to write mathematics badly?

Title of paper: A proof of a theorem of Euler.

Main Theorem: An fppf AP is regular.

References: [1] L. Euler, Collected Works (87 volumes)

(inspired by J.P. Serre)

How to write mathematics badly?

Title of paper: A proof of a theorem of Euler.

Main Theorem: An fppf AP is regular.

References: [1] L. Euler, Collected Works, volume 7, p. 24.

Talk to your supervisor about our writing!

(inspired by J.P. Serre)

How to write mathematics badly?

Title of paper: A proof of a theorem of Euler.

Main Theorem: An fppf AP is regular.

References: [1] L. Euler, Collected Works, volume 7, p. 24.
[2] A. Smith, *On properties of arithmetic progressions*, Proceedings of the Slovenian Math Soc. 1885.
[3] J. von Neumann, private communication.

(inspired by J.P. Serre)

How to write mathematics badly?

Writing and publishing

- Why?
- How to write mathematics badly?
- Where?

Where to publish?

- **Peer-reviewed journal papers** (in maths the gold standard?)

  pay-to-read (subscription, a main cost of university libraries)
  or pay-to-publish (open access)
  related “archive overlay”

advantage:
expert referees (hopefully) study the paper and approve it – or find mistakes. Only submit carefully polished, definite version.

publication in prestigious journal adds some prestige to your paper and may help your career.

Where to publish? Beware of predatory journals

Invitation for publishing manuscript

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For author's convenience, we strongly follow the following steps.
1. Response will be given within 12 hours
2. The paper will be reviewed within 2 to 5 days

Where to publish?

- **Peer-reviewed journal papers** (in maths the gold standard?)
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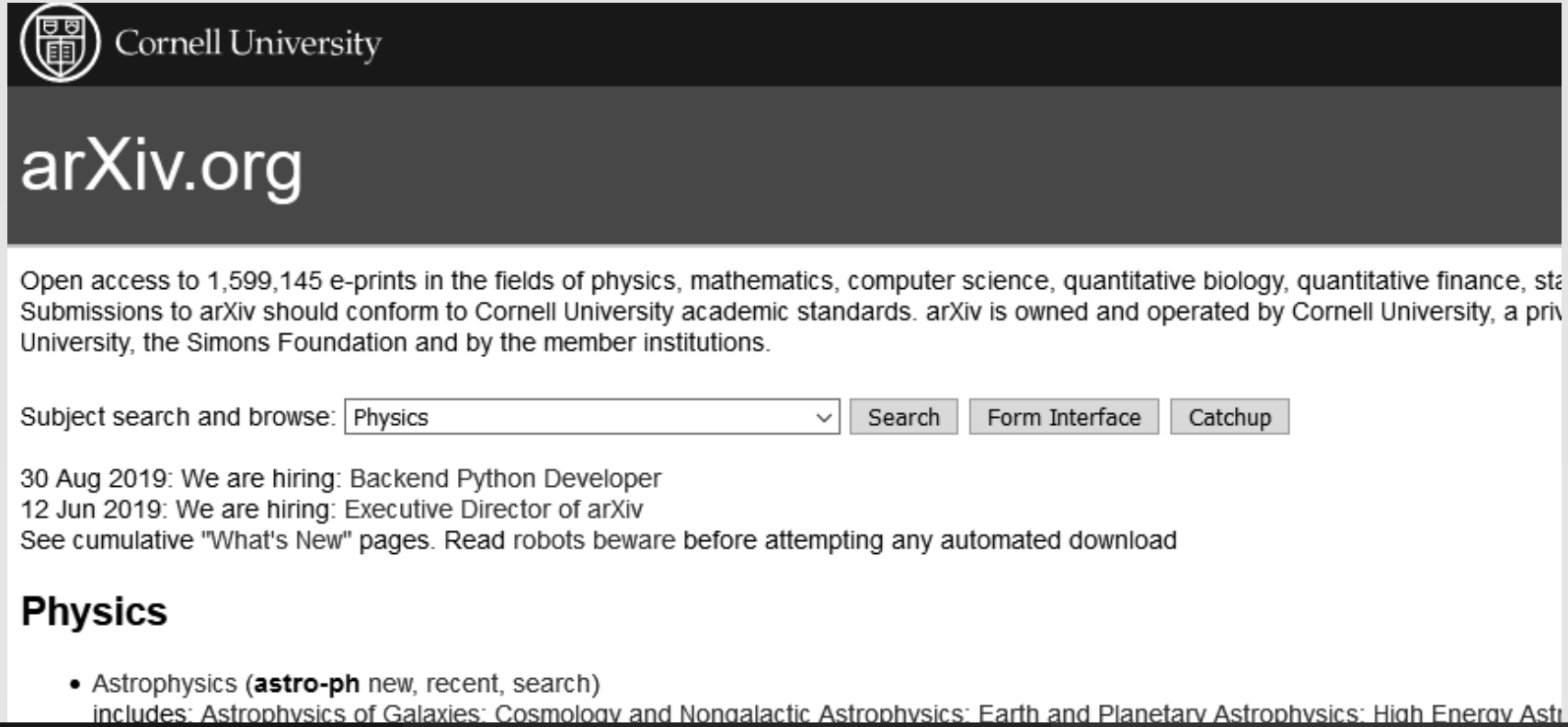
  or pay-to-publish (open access)
  related “archive overlay”
- **Conference papers**
  (the gold standard in computer science, but not in maths)
  often lightly peer-reviewed, sometimes not at all
- **Books**, academic or popular
- **Preprints or technical reports in repositories**
  arxiv.org, HAL, biorxiv
  repository of the research group or institution

Where to publish? preprint server arxiv.org

- ca. 3000 new maths preprints / month (2019)
- use depends on research area, can (should?) still publish in journal
- some important papers by Fields medalists like T. Tao, M. Kontsevich only published there
- G. Perelman's proof of Poincaré conjecture only published there



Where to publish?

- **Peer-reviewed journal papers** (in maths the gold standard?)
- **Conference papers**
- **Books**, academic or popular
- **Preprints or technical reports in repositories**
- **Theses**
- **Software**, open source or commercial
- **Patents**
- **Personal websites, blogs, social media** post preprints, lecture notes, slides of talks, . . .

Fields medalist Terry Tao's blog

What's new

Updates on my research and expository papers, discussion of open problems, and other maths-related topics. By Terence Tao

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David Roberts on

The Collatz conjecture, Littlewood-Offord theory, and powers of 2 and 3

25 August, 2011 in expository, math.DS, math.NT, question | Tags: Baker's theorem, Collatz conjecture, Littlewood-Offord problem

One of the most notorious problems in elementary mathematics that remains unsolved is the Collatz conjecture, concerning the function $f_0 : \mathbf{N} \to \mathbf{N}$ defined by setting $f_0(n) := 3n + 1$ when n is odd, and $f_0(n) := n/2$ when n is even. (Here, $\mathbf{N}$ is understood to be the positive natural numbers $\{1, 2, 3, \ldots\}$.)

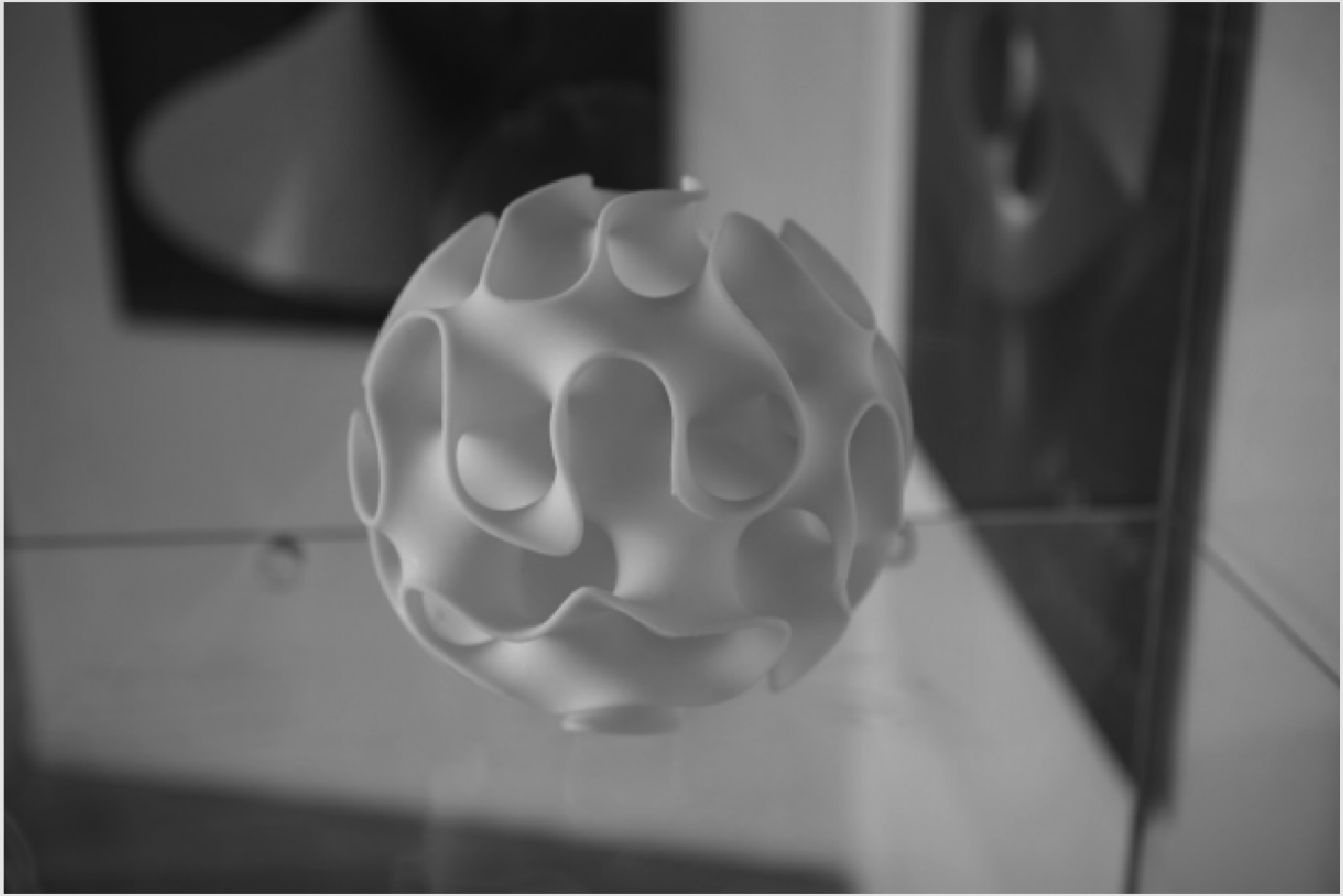
Conjecture 1 (Collatz conjecture) For any given natural number n, the orbit $n, f_0(n), f_0^2(n), f_0^3(n), \ldots$ passes through 1 (i.e. $f_0^k(n) = 1$ for some k).

Where to publish?

- **Peer-reviewed journal papers** (in maths the gold standard?)
- **Conference papers**
- **Books**, academic or popular
- **Preprints or technical reports in repositories**
- **Theses**
- **Software**, open source or commercial
- **Patents**
- **Websites, blogs, social media**
- **Newspapers, magazines, TV, press releases**
- **Photo competitions, works of art, . . .**

(Thanks to D. Pritchard.)

Imaginary exhibition



Source: Imaginary

Don’t plagiarise, not even yourself

- **Ideas and results** are the currency in scientific research.
- Plagiarism is the act of presenting borrowed *words or ideas* as your own. **DON’T.**
- Give credit, where credit is due. Acknowledge sources of text or ideas.
- Also don’t self-plagiarise.
- Changing a few words might not be enough to make it *yours*.

Writing and publishing research

- Why? For whom?
- Good exposition is crucial for colleagues
  to understand, trust and use your results
- Where?
  Gold standard is the peer-reviewed journal paper
  Preprint servers, personal websites make access to results easier
  Depending on research area additional opportunities