Maths and Society

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"The study of mathematics is, if an unprofitable, a perfectly harmless and innocent occupation."

— G. H. Hardy, 1920.

Hardy

- Godfrey Harold Hardy (1877–1947).
- Professor at Oxford and Cambridge.
- Researcher in number theory and analysis.

Hardy wrote in *A Mathematician's Apology* (1940):

> "Science works for evil as well as for good (and particularly, of course, in time of war) ; and both Gauss and lesser mathematicians may be justified in rejoicing that there is one science at any rate, and that their own, whose very remoteness from ordinary human activities should keep it gentle and clean."

Hardy wrote in *A Mathematician's Apology* (1940):

> "If useful knowledge is. . . knowledge which is likely, now or in the comparatively near future, to contribute to the material comfort of mankind, so that mere intellectual satisfaction is irrelevant, then the great bulk of higher mathematics is useless. Modern geometry and algebra, the theory of numbers, . . . no one of them stands the test much better than another, and there is no real mathematician whose life can be justified on this ground. If this be the test, then Abel, Riemann, and Poincaré wasted their lives; their contribution to human comfort was negligible, and the world would have been as happy a place without them."

Hardy

- This is all complicated, because Hardy has some snobbish views about what constitutes "the real mathematics of the real mathematicians" ("[Hogben] means by 'mathematics' the mathematics which he can understand, and which I have called 'school' mathematics", "it is what is commonplace and dull that counts for practical life", "It is indeed rather astonishing how little practical value scientific knowledge has for ordinary men"), and we must consider the time he was writing.

- "No one has yet discovered any warlike purpose to be served by the theory of numbers or relativity, and it seems very unlikely that anyone will do so for many years. . . . So a real mathematician has his conscience clear."
- Hardy writes about the uselessness of
  - number theory (cryptography);
  - relativity (GPS);
  - quantum mechanics (lasers, microelectronics, MRI scanners).

Maths and society

- Mathematics and statistics are not neutral nor detached from society.
- Apart from the many uses of mathematics, there are issues to consider when mathematics interacts with society.
  - Creation of mathematical knowledge – who gets to participate, how are they funded?
  - How outcomes from mathematical work are used – in policy-making, in other disciplines, etc.
  - Ethics – who is impacted by the products of mathematical work, what biases are embedded?
  - How mathematics and statistics are communicated to those in wider society.

History of mathematics

- There is also history to consider.
- How did we get where we are today?
- What areas of mathematics and statistics emerge from problematic origins?
- What legacy is left in modern mathematics and statistics?

Maths and Society

- 'Maths and Society' within this module will consider these issues by exploring
  - the history of mathematics;
  - the stories mathematicians tell about it;
  - who gets to be a mathematician;
  - how is mathematical and statistical knowledge created;
  - how are mathematical and statistical results presented to and used by wider society.

Assessment

- Assessment is driven by your choice of topics.
- Each week, you will investigate a topic relevant to the module and prepare a brief report and presentation.
- Your report should use the template provided, which contains the following sections:
  1. Who did this work?
  2. Research question (50 words).
  3. Findings (500 words).
  4. References.
  5. Reflection on sources used (250 words).

Process

- Choose the topic in class on Friday.
- Work on it during the in-person class time on Friday and if necessary between classes.
- One person should submit the report by email to Peter (p.rowlett@shu.ac.uk) by 1pm the following Thursday to get feedback in class on the Friday.
- Give a brief group presentation in class on the Friday.

Assessment

- At the end of the module, you will work as a group on your report for the final submission.
- Choose one of the weekly research reports.
- You may complete more work on this as a group to get it to a standard you are happy to hand in.
- This must use the standard template provided.
- This forms part of the 70% coursework task due on 8th May 2025.

First week

- Form groups.
- Decide on a topic to investigate.
  - The theme this week is applications of mathematics.
  - Choose an area in which maths can be applied and investigate this.
  - Agree your topic with Peter before starting.
  - Peter can also advise on software to work collaboratively.