BO1.1. History of Mathematics

Sheet 4 — MT25

Reading for weeks 7 and 8:

- Stedall, Chapters 6, 15 and 17
- Katz, Sections 14.4, 19.3, 21.4, 22.3 and 24.2.2

(On complex analysis, linear algebra, number theory, and non-Euclidean geometry.)

Essay to be submitted by 12 noon on Monday of week 8:

On the next page, you will find two extracts that appeared in the 2025 exam paper. Choose *one* and comment on its context, content, and significance. You might like to plan out your essay roughly in advance and then write it under exam-style time constraints (i.e., limiting yourself to c.30 minutes). If you choose *not* to work to a time constraint, please do not exceed 1,000 words. At the top of your essay, please indicate which approach you have taken.

Discussion topic to be prepared for the class in week 8:

Choose your favourite AI platform and have a conversation with it on the theme of 'Who was the greatest mathematician of all time?' Ask it supplementary questions and challenge the assertions that it makes. We will structure a class discussion around the results that you find.

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Extract 1

[BOOK I, SECTION I] LEMMA I.
Quantities, and the ratios of quantities, which in any finite time converge continually to equality, and before the end of that time approach nearer the one to the other than by any given difference, become ultimately equal.

If you deny it; suppose them to be ultimately unequal, and let D be their ultimate difference. Therefore they cannot approach nearer to equality than by that given difference D; which is against the supposition.

[Isaac Newton, *Philosophiæ naturalis principia mathematica*, 1687, translation by Andrew Motte]

Extract 2

26. Definition. A transformation ϕ of a system S is said to be *similar* [*ähnlich*] or *distinct*, when to different elements a, b of the system S there always correspond different transforms $a' = \phi(a)$, $b' = \phi(b)$. [...]
[...]
32. Definition. The systems R, S are said to be *similar* when there exists such a similar transformation ϕ of S that $\phi(S) = R$ [...]
[...]
64. Definition. A system S is said to be *infinite* when it is similar to a proper part of itself (32); in the contrary case S is said to be a *finite* system.

[Richard Dedekind, *Was sind und was sollen die Zahlen?*, 1888, pp. 8, 10, 17, translation by Wooster Woodruff Beman]

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