

Ideas in Mathematics

University of Pennsylvania
Math 170, Spring 2016
Writing Assignment

Write a short paper describing an important person in the development of mathematics and a problem or idea to which they contributed. The paper is due on the last day of classes, Wednesday, April 27. I will be happy to read and provide feedback on drafts submitted before April 13th; only the final submission will count for a grade. Included with these instructions is a list of suggested people and topics. Many other people and topics would be acceptable, though you must clear any suggestion with me or Dominick.

1. The paper should be 1-4 typed pages. No more than half of the paper should be biographical; instead, focus more on the mathematical ideas.
2. It is much better to focus on one idea in greater depth than on many ideas in less depth.
3. Keep things simple. Write this paper so that your roommate can understand it. It's ok if you don't understand everything you read on your chosen topic – these are big ideas! But don't try writing about something you don't understand, or it will sound like that.
4. Write using proper English composition conventions, including standard spelling, grammar, and documentation. Any convention of citing sources is acceptable as long you use it clearly and consistently.
5. This assignment is not meant as an exercise in copying and pasting, in which you are all certainly proficient. Likewise, your paper should **not** be a summary of a book, a wikipedia article, or another webpage.
6. Make your paper interesting! Quoting tons of books and articles and using many fancy words will not improve a boring paper. The most important step you can take to make your paper interesting is thinking deeply about your subject before you begin writing.

For those who might find it helpful, here is a suggestion for how you might structure your paper. Begin by describing some historical background of your chosen character. Next, describe a challenging problem or idea which your person considered. Make clear what that problem is, why it was interesting, and why it was difficult. Finally, describe what your chosen figure contributed towards solving this problem or towards understanding a particular idea. This might involve describing a proof, or even just some ideas related to the proof. If appropriate, you might also add some discussion of the lasting impact (or lack thereof) of this work on mathematics and science.

Grading

The paper will be graded out of 50 points, based on the following:

Biographical history:	20 points
Mathematics:	20 points
Writing:	10 points

Suggested people and topics

Alan Turing	undecidability
Alfred N. Whitehead	Principia Mathematica
Andrew Wiles	Fermat's last theorem
Archimedes	Archimedean solids
Bernhard Riemann	integration
Carl F. Gauss	curvature
David Hilbert	Hilbert matrix
Emmy Noether	Noether's theorem
Euclid	parallel postulate
Évariste Galois	Galois theory
Felix C. Klein	Klein bottle
Gerolamo Cardano	Complex numbers
Grigori Perelman	Poincaré Conjecture
Harold S.M. Coxeter	Tutte-Coxeter graph
Henri Poincaré	three-body problem
Ingrid Daubechies	wavelets
John F. Nash, Jr.	Nash embedding theorem
John H. Conway	classification of finite simple groups
John von Neumann	cellular automata, middle-square method
Joseph Fourier	Fourier analysis
Joseph-Louis Lagrange	irrationality of π
Karl W. T. Weierstrass	continuity
Kurt Gödel	incompleteness
Niels H. Abel	quintic insolvability
Paul Erdős	Ramsey theory
Pythagoras	Pythagorean triples
René Descartes	Cartesian coordinates
Roger Penrose	tilings
Sophie Germain	Germain primes
Srinivasa Ramanujan	partitions
Thomas Hales	Kepler Conjecture
William R. Hamilton	quaternions