Mathematics 226H – Geometry I: Euclidean geometry
TRENT UNIVERSITY, Winter 2008

Some sources on the foundations of geometry

Below is some information about two original sources on the foundations of geometry which might be useful in MATH 226H. This is *not* a comprehensive list, so don't be shy about searching Bata Library and the Internet for other editions of these sources and other information about the foundations of Euclidean geometry. Wikipedia (`http://wikipedia.org`), in particular, has decent articles on Euclidean geometry and related topics, many of which include links to other online resources of interest.

Euclid's *Elements* was the standard text on Euclidean geometry for two thousand years and is still worth checking out. It begins with lists of terms, basic definitions, and basic assumptions, and proceeds to build up the subject. All we'll need of it is the beginning of the first of the thirteen "books" into which the *Elements* is dividided. The most readily available print edition in English of the *Elements* is:

> *The Thirteen Books of the Elements*, Euclid. Translated with introduction and commentary by Sir Thomas L. Heath.
> Reprinted by Dover Publications, Inc., New York. Vol 1, ISBN 0-486-60088-2; Vol. 2, ISBN 0-486-60089-0; Vol. 3, ISBN 0-486-60090-4.

The best freely accessible online edition is probably:

> *Euclid's Elements*, David E. Joyce
> `http://aleph0.clarku.edu/~djoyce/java/elements/toc.htm`

The more-or-less standard edition of the original Greek text, along with an nice parallel English translation, of the *Elements* is freely downloadable in PDF format:

> *Euclid's Elements in Greek*, Richard Fitzpatrick
> `http://farside.ph.utexas.edu/euclid.html`

It's a little debatable as to when a complete and correct axiomatization of Euclidean geometry was (finally) accomplished. (Basically, the question is whether one cares about embedding the axiomatization in a suitable formal logical system.) A pretty good candidate was given by David Hilbert in the late Nineteenth Century; again, we'll only need a small part of his monograph on the subject. A translation of this book into English is:

> *Foundations of Geometry*, David Hilbert. Authorized translation by E.J. Townsend.
> Reprint Edition, The Open Court Publishing Company, La Salle, Illinois.

This edition is freely available for download from Project Gutenberg at:

> `http://www.gutenberg.org/etext/17384`

A decent summary of Hilbert's axioms can be found in the Wikipedia article about them at:

> `http://en.wikipedia.org/wiki/Hilbert's_axioms`