

To do: Write an essay or craft a digital presentation, on a topic pertaining to this course, aimed at an audience having no more than a bachelor's degree in math. Essays/Videos of sufficient quality will be posted to the Geometric Viewpoint blog and made public. You will also give a 5 minute summary of your topic to the class on the final day of class.

Qualities of a good essay/video: A clear and consistent choice of audience. Engaging prose and a rhythm propelling the reader forward. Clear exposition of a particular geometric topic, written in a personable, but professional, manner. Appropriate choices of notation, images, videos, and proofs. Citation of sources and information on how to find out more about a topic.

Additional Requirements: Any images (etc) you use from another source must be professionally cited and either must be in the publi domain or the usage must fall within the realm of "fair use." Sources you quote from or paraphrase must have in-line citations to a bibliography at the end. You must make use of at least one published journal article on your topic. (See me for help in finding such an article, or use the arXiv or MathSciNet). Sources you use in crafting your presentation but do not explicitly quote or paraphrase must be listed in a "further reading" section. Essays must be written in \LaTeX (feel free to ask for help if needed). Do not let the

Deadlines:

- **Friday, November 18:** Choice of topic and list of one or two main sources due to Scott via email.
- **Wednesday, November 30:** Detailed outline/plan for project due to Scott via email.
- **Monday, December 5:** (optional) Draft of project due to Scott for feedback.
- **Friday, December 9:** In-class presentations (plan to use one or two projected slides) and final version due.

Potential Topics:

- Applications of hyperbolic geometry: general relativity, scale-free networks, chemistry, dynamical systems, complex analysis, number theory
- Come up with your own problem pertaining to course material and try to solve it (doesn't matter if you don't succeed!) Write your essay about what interests you in the problem and your thoughts about solving it.
- Pick a topic from Schwartz or Bonahon, learn more about it and write your essay explaining that topic. Be sure to pick something you feel you can contribute to. If Schwartz already has the perfect explanation, there's no sense in you writing an essay! You should be sure to draw on
- Learn how to use the program SnapPea and write an essay about it!
- Invent a board game that could be played on the hyperbolic plane and which uses some hyperbolic geometry.
- Write your own computer program to visualize some things from the course and write your essay about what your program can do!
- Learn about projective geometry and write an essay explaining how spherical, hyperbolic, and euclidean geometries are all examples of projective geometry.
- Learn about the history of the discovery of hyperbolic geometry and write an essay on it!
- Learn about how Poincaré got interested in hyperbolic geometry and write about it!
- Learn about Kleinian Groups (these are certain kinds of symmetries of hyperbolic 3-space, with a close connection to knots)
- (If you didn't take MA 434 with me) Learn about hyperbolic groups and write an essay

- Learn about geodesics on platonic solids or other euclidean cone surfaces and make a video.
- Learn about curvature of surfaces and make a Numberphile-style video.
- Collect all the different models of hyperbolic geometry you can.