Non-Euclidean Geometries Project

In three dimensions, there are three classes of constant curvature geometries. All are based on the first four of [Euclid's postulates](http://mathworld.wolfram.com/EuclidsPostulates.html), but each uses its own version of the [parallel postulate](http://mathworld.wolfram.com/ParallelPostulate.html). The "flat" geometry of everyday intuition is called [Euclidean geometry](http://mathworld.wolfram.com/EuclideanGeometry.html) (or plane geometry), and the non-Euclidean geometries are called [hyperbolic geometry](http://mathworld.wolfram.com/HyperbolicGeometry.html) (or Lobachevsky-Bolyai-Gauss geometry) and [elliptic geometry](http://mathworld.wolfram.com/EllipticGeometry.html) (or Riemannian geometry). [Spherical geometry](http://mathworld.wolfram.com/SphericalGeometry.html) is a non-Euclidean two-dimensional geometry which is a subset of elliptic geometry. It was not until 1868 that Beltrami proved that non-Euclidean geometries were as logically consistent as [Euclidean geometry](http://mathworld.wolfram.com/EuclideanGeometry.html).

The discovery on non-Euclidean geometries has introduced new objects that depict the phenomena of the universe including fractals. A fractal is “an object whose detail is not lost as it is magnified” (Pappas, 1989, p. 78).

One of the first non-Euclidean geometries to surface, projective geometry developed and played a major part in Renaissance art. It involves problems of perspective with three-dimensional paintings.

Create a PowerPoint slide show with the following components:

* The history of this geometry
* The specific major tenets or axioms of this geometry
* How this geometry contrasts and compares with Euclidean geometry
* Practical uses of this geometry

For your topic, please choose between:

* Spherical geometry
* Elliptical geometry
* Hyperbolic geometry
* Projective geometry
* Fractals

The slide show will be evaluated for its thoroughness in addressing the
four components, for its grammatical quality, and for its creativity. Please
upload your slide show into Desire2Learn Assignments, and plan for a
12-15 minute presentation to your peers.

***This project will count as two quiz scores and is due on Monday, April 30. Presentations in class will be on Wednesday, May 2, the last day of class.***

Suggested Sources:

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Carslaw, H. S. [*The Elements of Non-Euclidean Plane Geometry and Trigonometry.*](http://www.amazon.com/exec/obidos/ASIN/B0006AHNQ8/ref%3Dnosim/ericstreasuretro) London: Longmans, 1916.

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Hopf, H. "Selected Chapters of Geometry." ETH Zürich lecture, pp. 1-2, 1940. <http://www.math.cornell.edu/~hatcher/Other/hopf-samelson.pdf>.

Iversen, B. [*An Invitation to Hyperbolic Geometry.*](http://www.amazon.com/exec/obidos/ASIN/0521435285/ref%3Dnosim/ericstreasuretro) Cambridge, England: Cambridge University Press, 1993.

Iyanaga, S., & Kawada, Y. (Eds.). "Non-Euclidean Geometry." §283 in [*Encyclopedic Dictionary of Mathematics.*](http://www.amazon.com/exec/obidos/ASIN/0262590204/ref%3Dnosim/ericstreasuretro) Cambridge, MA: MIT Press, pp. 893-896, 1980.

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