

Quizzes #7, #8, & #9
Reading Guide for Handout on Non-Euclidean Geometries
Mathematics 308—Modern Geometry
Dr. Peratt

Directions: Read the Handout on Non-Euclidean Geometries, and answer the following questions based on the reading.

1. Hilbert's rigorous axiomatization of classical Euclidean Geometry utilized 16 axioms in lieu of Euclid's 5 axioms. Into which categories were these axioms divided?
2. Name the three types of geometries that are based on variations of Euclid's Parallel Postulate.
3. Identify the main advantages and disadvantages of the Klein-Beltrami and Poincare' models of Hyperbolic Geometry.
4. What is a Lambert Quadrilateral, and why is it significant?
5. What two properties does Projective Finite Geometry share with Elliptic Geometry?
6. Describe briefly the notion of *duality* for Projective Planes.
7. How do Projective Planes give rise to Affine Planes?
8. Describe the main advantage of minimal geometries; that is, what advantage is there to having a minimal amount of structure in a geometry?
9. What is Synthetic Geometry?
10. Who is primarily responsible for the development of Analytic Geometry, and what was so powerful about this new type of mathematics?
11. Just as three different geometries can be formed by varying Euclid's Parallel Postulate, a number of non-Euclidean Geometries can be created by altering Hilbert's Axioms of Euclidean Geometry. Which four classes of geometries are created in this way?
12. Fractal Geometry exists within Euclidean Geometry (and alters non of the axioms of Euclidean Geometry). So, what does Fractal Geometry include that classical Euclidean Geometry does not?
13. Write a short paragraph, after watching the Veritasium video on Non-Euclidean Geometries, the highlights one aspect of this story that you found particularly enlightening (mind-blowing or fascinating or otherwise interesting).