

Working knowledge of the main results from Euclid, books 1-4. You need to be able to state the results and use them in simple problems. You should be able to state, prove, and use the following propositions from the Elements.

Book 1: Propositions 8, 9, 10, 11, 12, 23, 26, 27, 29, 31, 32, 47.

Book 2: Propositions 11, 12, 13, 14 (squaring a rectangle).

Book 3: Propositions 16, 17, 18, 19, 20, 21, 22, 23, 31, 32, 35, 36, 37.

Book 4: Propositions 4, 5, 10, 11.

You should know which of them hold in any Hilbert plane and which require additional axioms (like (P) or (E)).

Results and definitions from geometry of triangles. Definition and properties of the 9 point circle.

Simpson's line. Miquel point.

Hilbert's axioms. The notion of side of a line and side of a point on a line. Plane and line separation theorems. The notion of a segment, triangle, angle, interior. Basic properties of Hilbert's planes. The intersection of lines and circles (axiom (E) and its consequences). Archimedes axiom.

Euclidean planes. Theory of similar triangles. Classification of Euclidean planes as Cartesian planes over Euclidean fields.

Inversion and its properties. Orthogonal circles. Cross-ratio.

The Poincare model. Definition of lines, betweenness, congruence of segments and angles. The multiplicative distance d (denoted by μ in the book) and its properties. Ability to do basic computations with μ . The concept of rigid motions. Rigid motions of the Poincare model.

Legendre's Axiom. The notion of limiting parallel rays and its properties. Hyperbolic axiom and the notion of a hyperbolic plane.

Study carefully the first exam. The final will have similar format.

The final exam is on Monday, December 9, 12:50 pm-14:50 pm in CW 107