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Distance in terms of cross ratio"; "5.8 Alternative treatment using the complex line"

"CHAPTER VI. ELLIPTIC GEOMETRY IN TWO DIMENSIONS""6.1 Spherical and elliptic geometry"; "6.2 Reflection"; "6.3 Rotations and angles"; "6.4 Congruence"; "6.5 Circles"; "6.6 Composition of rotations"; "6.7 Formulae for distance and angle"; "6.8 Rotations and quaternions"; "6.9 Alternative treatment using the complex plane"; "CHAPTER VII. ELLIPTIC GEOMETRY IN THREE DIMENSIONS"; "7.1 Congruent transformations"; "7.2 Clifford parallels"; "7.3 The Stephanos-Cartan representation of rotations by points"; "7.4 Right translations and left translations"; "7.5 Right parallels and left parallels"; "7.6 Study's representation of lines by pairs of points"; "7.7 Clifford translations and quaternions"; "7.8 Study's coordinates for a line"; "7.9 Complex space"; "CHAPTER VIII. DESCRIPTIVE GEOMETRY"; "8.1 Klein's projective model for hyperbolic geometry"; "8.2 Geometry in a convex region"; "8.3 Veblen's axioms of order"; "8.4 Order in a pencil"; "8.5 The geometry of lines and planes through a fixed point"; "8.6 Generalized bundles and pencils"; "8.7 Ideal points and lines"; "8.8 Verifying the projective axioms"; "8.9 Parallelism"

Sommario/riassunto

Throughout most of this book, non-Euclidean geometries in spaces of two or three dimensions are treated as specializations of real projective geometry in terms of a simple set of axioms concerning points, lines, planes, incidence, order and continuity, with no mention of the measurement of distances or angles. This synthetic development is followed by the introduction of homogeneous coordinates, beginning with Von Staudt's idea of regarding points as entities that can be added or multiplied. Transformations that preserve incidence are called collineations. They lead in a natural way to isometries or 'congruent transformations'. Following a recommendation by Bertrand Russell, continuity is described in terms of order. Elliptic and hyperbolic geometries are derived from real projective geometry by specializing an elliptic or hyperbolic polarity which transforms points into lines (in two dimensions) or planes (in three dimensions) and vice versa.
