MMAT5120 HW 1

Due Date: Oct 18, 2018 (in class)

(1) Show that $(\infty, z_1, z_2, z_3) = \frac{z_1 - z_3}{z_1 - z_2}$.

(2) Find a Möbius transformation sending $0, i, -1$ to $-i, 1, 0$ respectively.

(3) Find all Möbius transformations with fixed points i and $-i$.

(4) Using Fundamental theorem of Möbius geometry, show that all lines are congruent in Möbius geometry.

(5) Let z be a point inside the circle $C: |z-a| = R$. Suppose that p, q be the two distinct points on the C such that the line segment $\overline{pq}$ passing through z and is perpendicular to $\overline{az}$. Show that the tangents to C at p and q meet at z^* (symmetric point of z wrt C).

(End)