

Mth 611 Assignment 1 | Name:

Bent Petersen 611s2005-001.tex Due date: Fri April 15, 2005 17:10

Instructions: Please supply your solution(s) by the due date in the space provided below. Continue on to the back of the sheet if you need more space. Do not turn in any additional paper. For additional comments and instructions check my webpage <http://oregonstate.edu/~peterseb>

Problem 1.1 Let $c > \rho > 0$ and let Γ_1 and Γ_2 be circles of radius ρ with centers at c and $-c$, respectively. Let L be the imaginary axis (together with the point at infinity). Show there is a real number a with $c - \rho < a < c$ such that $-a$ and a are Γ_1 symmetric and Γ_2 symmetric. Let the Möbius transform T be defined by

$$T(z) = \frac{z - a}{z + a}.$$

Give a brief argument to show that $T(\Gamma_1)$, $T(L)$ and $T(\Gamma_2)$ are concentric circles with center at the origin, $T(L)$ has radius 1 and the radii of $T(\Gamma_1)$ and $T(\Gamma_2)$ are reciprocals.

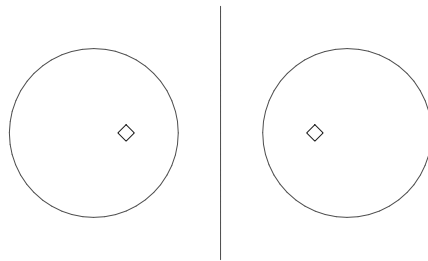


Figure 1: The diamonds indicate the points $\pm a$