
Complex Analysis I: Problem Set X

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Abstract

This work contains the solutions to the problem set X of Complex Analysis I 2015 at Courant Institute of Mathematical Sciences.

Question 1.

1. Find the fractional linear transformation which sends $1, i, -i$ to $2, -1, 1$ respectively.

Solution.

Question 2.

2. Find the fractional linear transformation which carries the circle $|z| = 2$ into $|z + 1| = 1$, the point -2 into the origin, and the origin into i .

Solution.

Question 3.

3. Suppose that a fractional linear transformation sends a pair of concentric circle to another pair of concentric circle, show the ratios of the radius must be the same.

Solution.

Question 4.

4. Find a fractional linear transformation which carries $|z| = 1$ and $|z - \frac{1}{4}| = \frac{1}{4}$ into concentric circles. What is the ratio of radius?

Solution.

Question 5.

5. Given a circle or line, we call the map sending any point to its symmetric point as a reflection. Reflect the imaginary axis, the line $x = y$, and the circle $|z| = 1$ into the circle $|z - 2| = 1$.

Solution.