

EXERCISES 2.5

In Problems 1–10, find the image of the given set under the reciprocal mapping $w = 1/z$ on the extended complex plane.

1. the circle $|z| = 5$
2. the semicircle $|z| = \frac{1}{2}$, $\pi/2 \leq \arg(z) \leq 3\pi/2$
3. the semicircle $|z| = 3$, $-\pi/4 \leq \arg(z) \leq 3\pi/4$
4. the quarter circle $|z| = \frac{1}{4}$, $\pi/2 \leq \arg(z) \leq \pi$
5. the annulus $\frac{1}{3} \leq |z| \leq 2$
6. the region $1 \leq |z| \leq 4$, $0 \leq \arg(z) \leq 2\pi/3$
7. the ray $\arg(z) = \pi/4$
8. the line segment from -1 to 1 on the real axis excluding the point $z = 0$
9. the line $y = 4$
10. the line $x = \frac{1}{6}$

In Problems 11–14, use the Remarks at the end of Section 2.5 to find the image of the given set under the reciprocal mapping $w = 1/z$ on the extended complex plane.

11. the circle $|z + i| = 1$
12. the circle $|z + \frac{1}{3}i| = \frac{1}{3}$
13. the circle $|z - 2| = 2$
14. the circle $|z + \frac{1}{4}| = \frac{1}{4}$

In Problems 15–16, find the image of the given set S under the mapping $w = 1/z$ on the extended complex plane.

15.

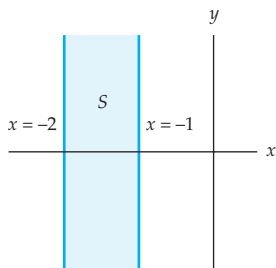


Figure for Problem 15

16.

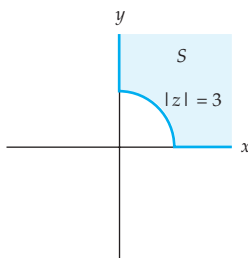


Figure for Problem 16