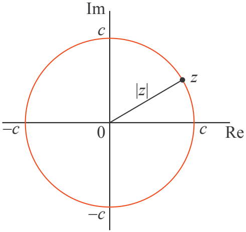
Lecture 2, Part 1

Lines on the Complex Plane

- Circle of given center and radius
- Perpendicular bisector of a line segment

The Equation $|z| = c$



Recall: $|z|$ is the distance of z from the origin.

Thus the equation

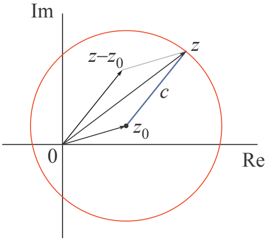
$$|z| = c$$

represents a circle of radius c centered at the origin.

Special case: unit circle, with $c = 1$.

The Equation $|z - z_0| = c$

(Here, z_0 is a fixed point on the complex plane; z is variable.)



$|z - z_0| =$ distance of z from z_0. Thus the equation

$$|z - z_0| = c$$

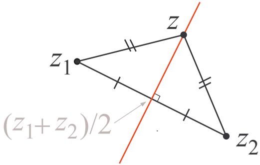
represents a circle of radius c centered at z_0.

Exercise: Set $z = x + jy$, $z_0 = a + jb$ and take $|\cdot|^2$ ▶

$$(x - a)^2 + (y - b)^2 = c^2$$

The Equation $|z - z_1| = |z - z_2|$

(Here, z_1 and z_2 are both fixed; z is variable.)



Point z is equidistant to z_1 and z_2.

The locus of all such points is the perpendicular bisector of the line segment joining z_1 and z_2.

Exercise: Write an equivalent equation in terms of x and y

- either using the midpoint $(z_1 + z_2)/2$ and the appropriate slope ($= -1/$(slope of segment))
- or squaring moduli: $|z - z_1|^2 = |z - z_2|^2$