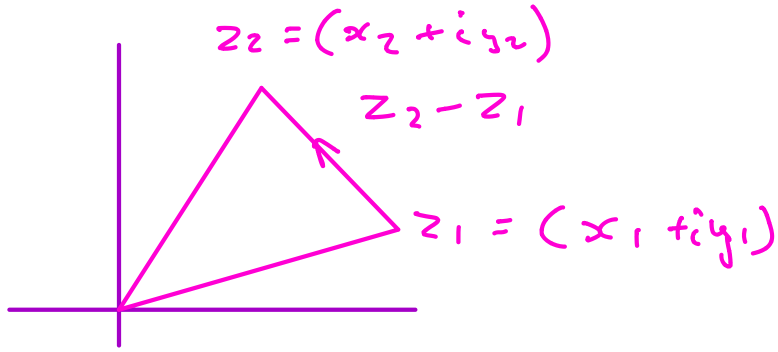
Loci in Argand Diagram

If $z_1 = x_1 + iy_1$

$z_2 = x_2 + iy_2$

then $|z_2 - z_1|$ represents the distance between z_1 and z_2 on an Argand diagram



Distance z_1 to z_2

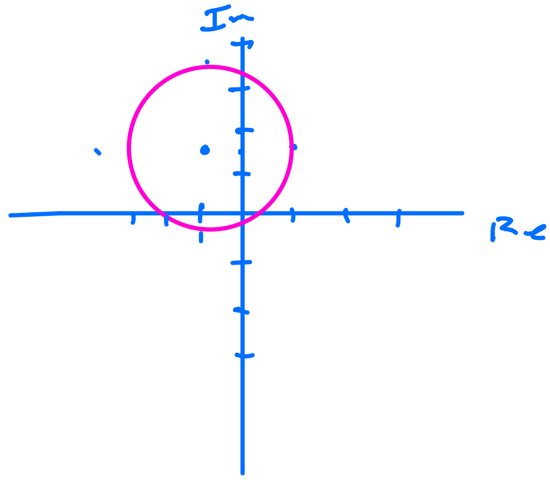
$$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Suppose $|z - z_1| = r$

The locus is a circle centre z_1 radius r

Example Draw the locus of $|z + 2 - 3i| = 4$

$$|z - (-2 + 3i)| = 4$$

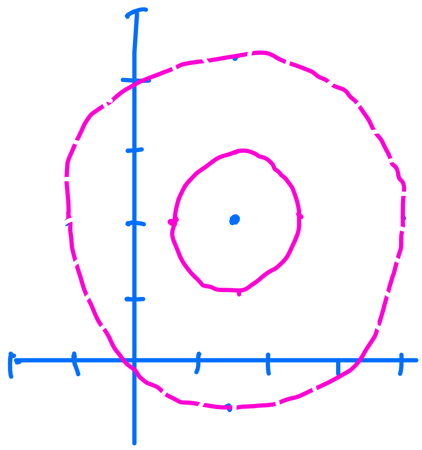


Circle centre $(-2+3i)$

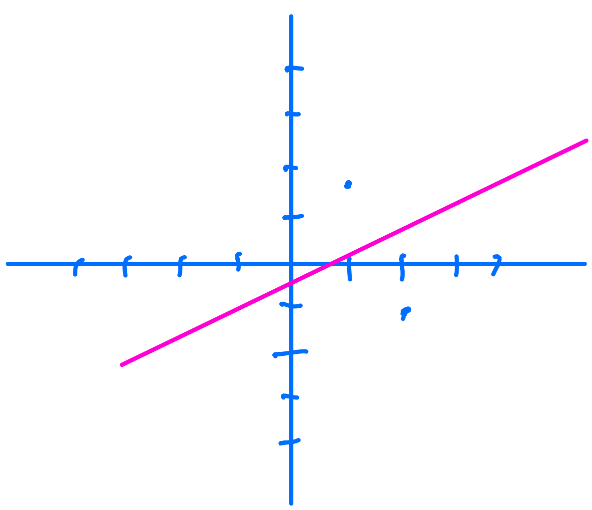
radius 4

Ex2 Draw $2 \leq |z - 3 - 4i| < 5$

$z-(3+4i)$



Ex3 $|z-(2+3i)| = |z-(4-2i)|$



Perpendicular Bisector of z_1 and z_2

Arguments

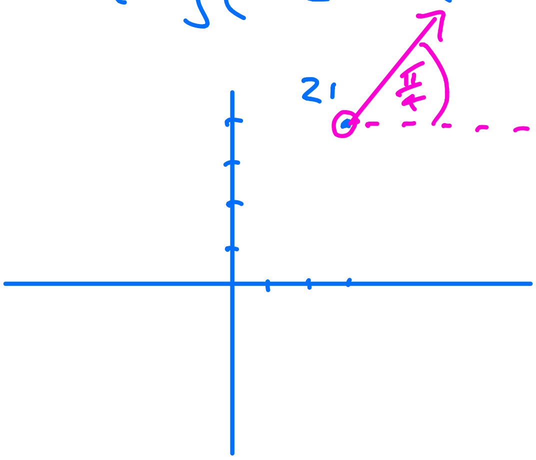
If $z_1 = x_1 + iy_1$

the locus of points $\arg(z - z_1) = \theta$ is a half-line from, but not including z_1 making an angle θ with a line from z_1 parallel to x-axis.

Example Draw locus of

$$\arg(z - 3 - 4i) = \frac{\pi}{4}$$

$$\arg(z - (3 + 4i)) = \frac{\pi}{4}$$

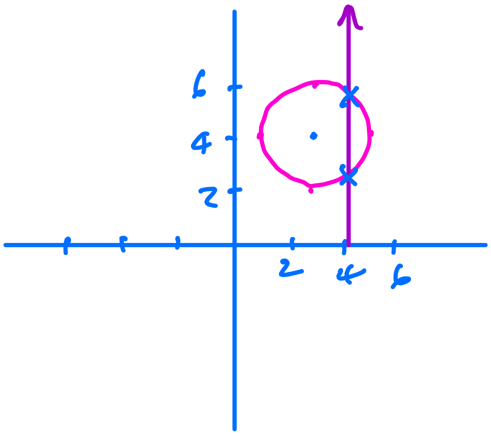


5 (i) Sketch the locus $|z - (3 + 4j)| = 2$ on an Argand diagram. [2]

(ii) On the same diagram, sketch the locus $\arg(z - 4) = \frac{1}{2}\pi$. [2]

(iii) Indicate clearly on your sketch the points which satisfy **both**

$$|z - (3 + 4j)| = 2 \quad \textbf{and} \quad \arg(z - 4) = \tfrac{1}{2}\pi. \qquad [1]$$



6
4
2
2
4
6