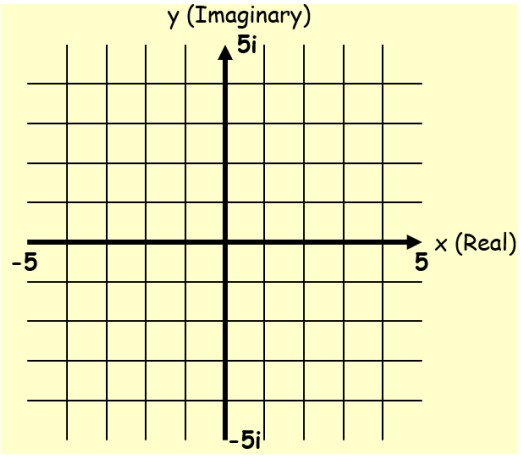
2A Introduction to Argand Diagrams

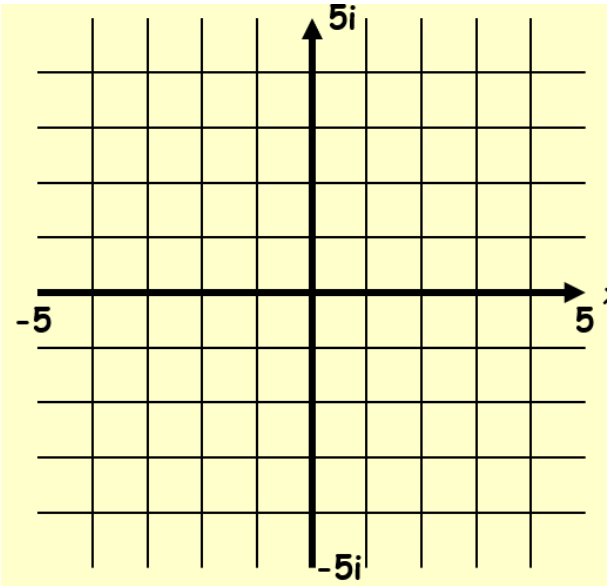


1. Represent the following complex numbers on an Argand diagram:

$$z_1 = 2 + 5i$$

$$z_2 = 3 - 4i$$

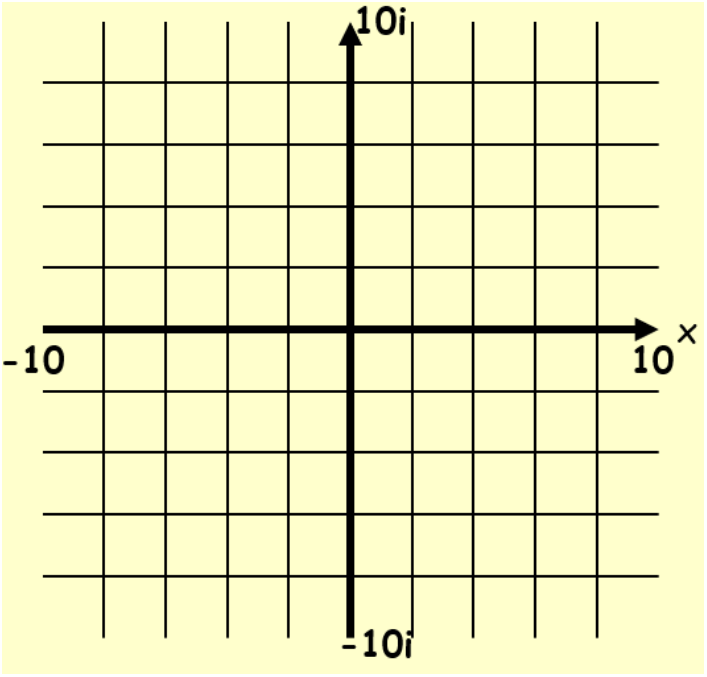
$$z_3 = -4 + i$$



Find the magnitude of |OA|, |OB| and |OC|, where O is the origin of the Argand diagram, and A, B and C are z_1, z_2 and z_3 respectively

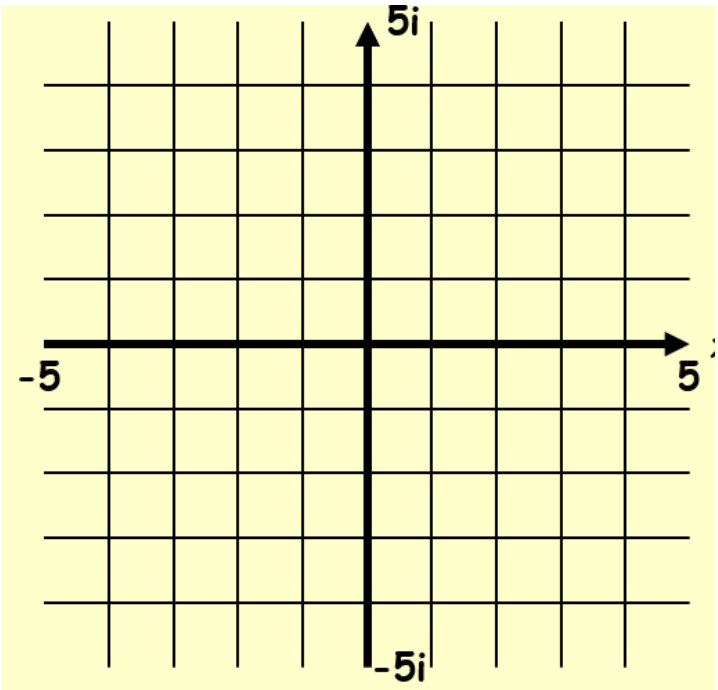
2. $z_1 = 4 + i \qquad z_2 = 3 + 3i$

Show z_1, z_2 and $z_1 + z_2$ on an Argand diagram

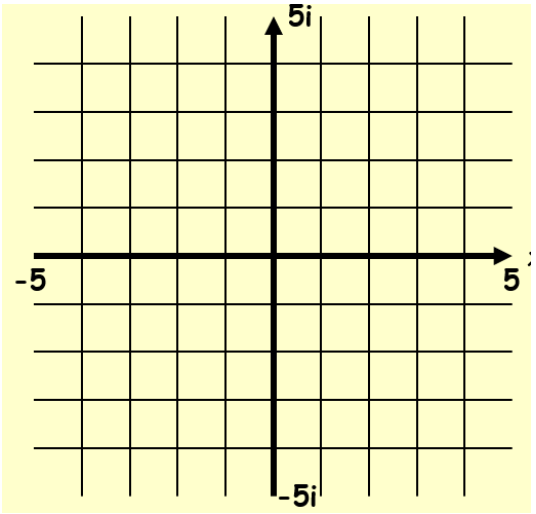


3. $z_1 = 2 + 5i \qquad z_2 = 4 + 2i$

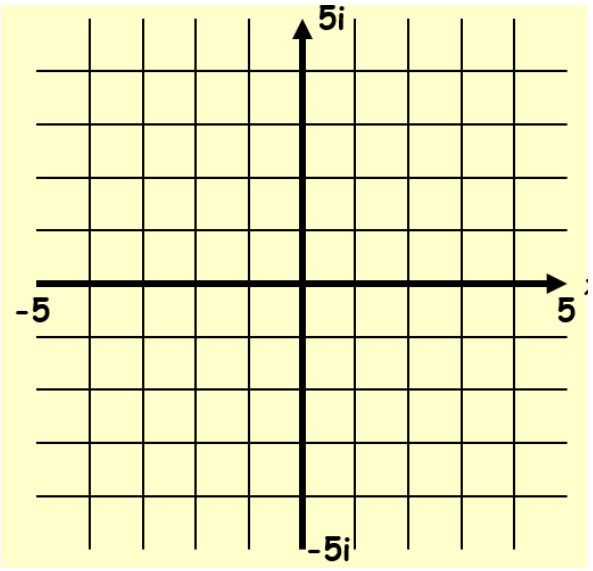
Show z_1, z_2 and $z_1 - z_2$ on an Argand diagram



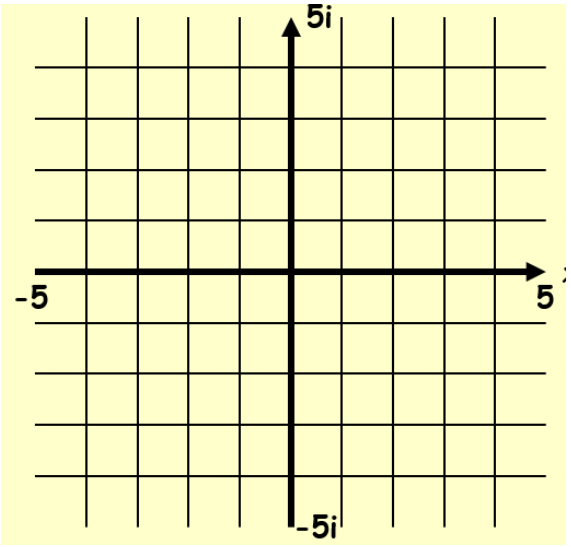
2B Modulus & Argument



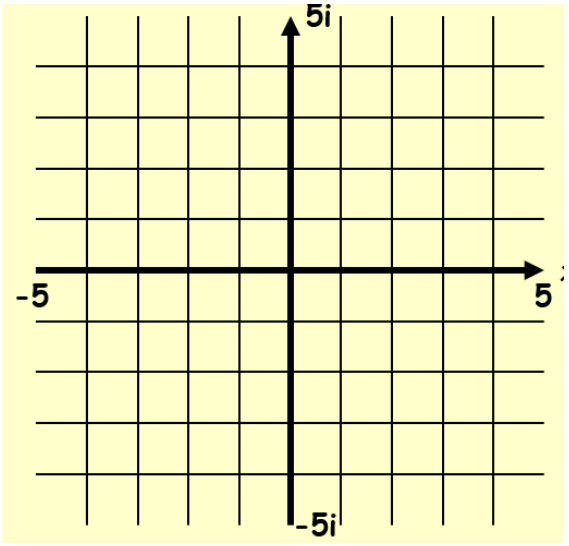
1. Find, to two decimal places, the modulus and argument of z = 4 + 5i



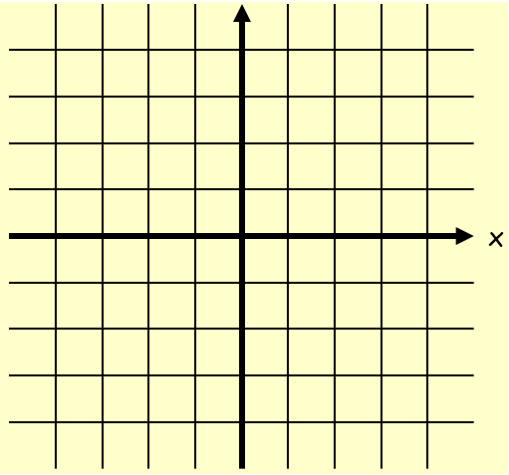
2. Find, to two decimal places, the modulus and argument of z = -2 + 4i



3. Find, to two decimal places, the modulus and argument of z = -3 - 3i



2C Modulus-Argument Form



1. Express the numbers following numbers in the modulus argument form:

a) $z_1 = 1 + i\sqrt{3}$

b) $z_2 = -3 - 3i$

2D Multiplying & Dividing in Modulus-Argument Form

1. Express the following calculation in the form x + iy:

a)

$$3\left(cos\frac{5\pi}{12}+isin\frac{5\pi}{12}\right)\times 4\left(cos\frac{\pi}{12}+isin\frac{\pi}{12}\right)$$

b)

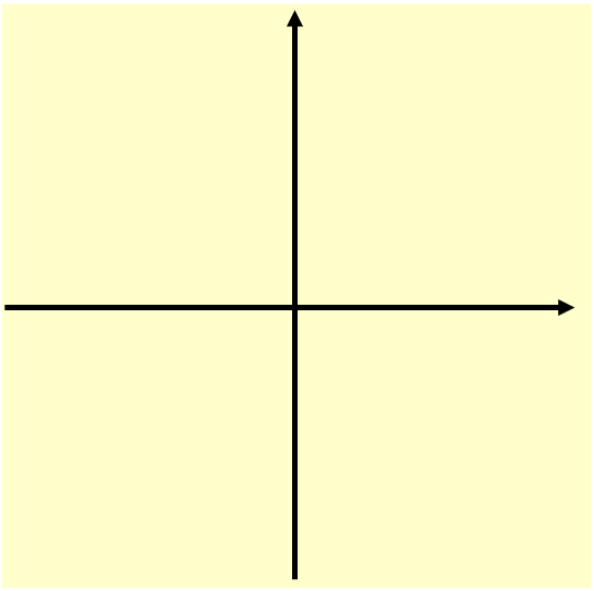
$$2\left(cos\frac{\pi}{15}+isin\frac{\pi}{15}\right)\times 3\left(cos\frac{2\pi}{5}-isin\frac{2\pi}{5}\right)$$

c)

$$\frac{\sqrt{2}\left(cos\frac{\pi}{12}+isin\frac{\pi}{12}\right)}{2\left(cos\frac{5\pi}{6}+isin\frac{5\pi}{6}\right)}$$

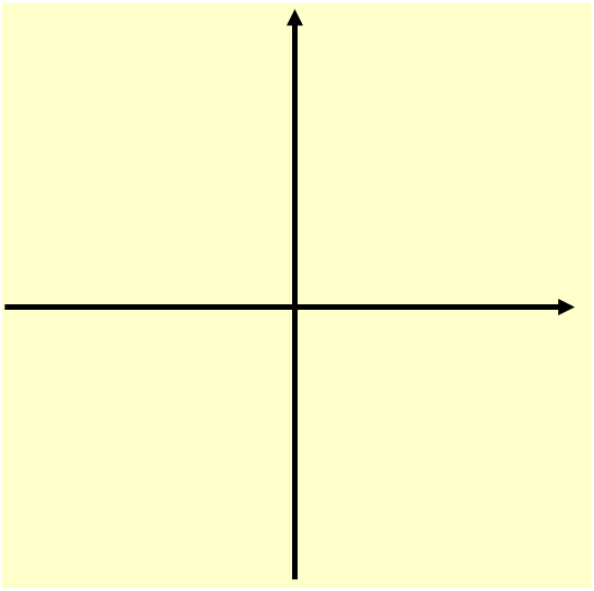
2E Loci on Argand Diagrams

$|z - z_1| = r$



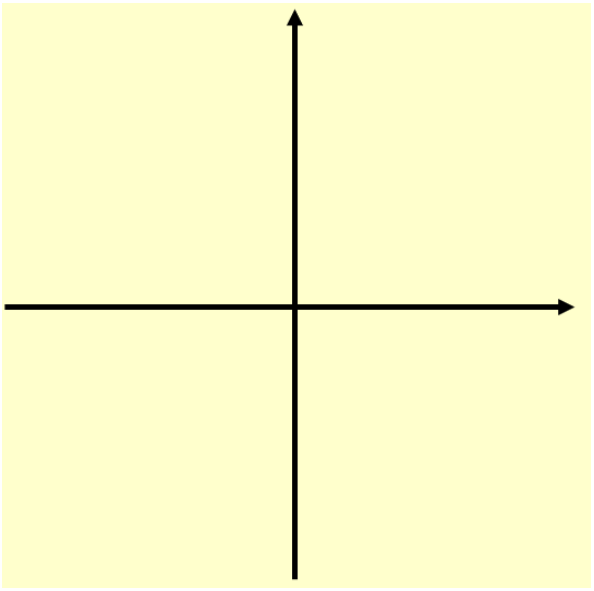
1. Given that $|z - 4| = 5$

a) Sketch the locus of z on an Argand diagram

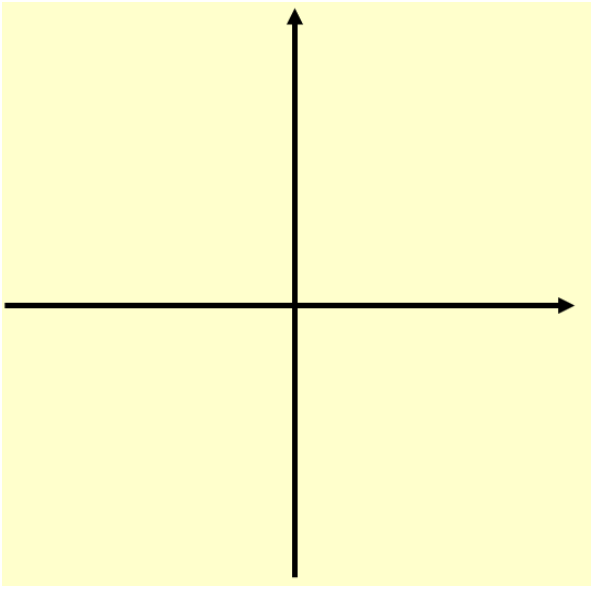


b) Find the values of z that satisfy:

i) $|z-4|=5$ and $Im(z)=0$

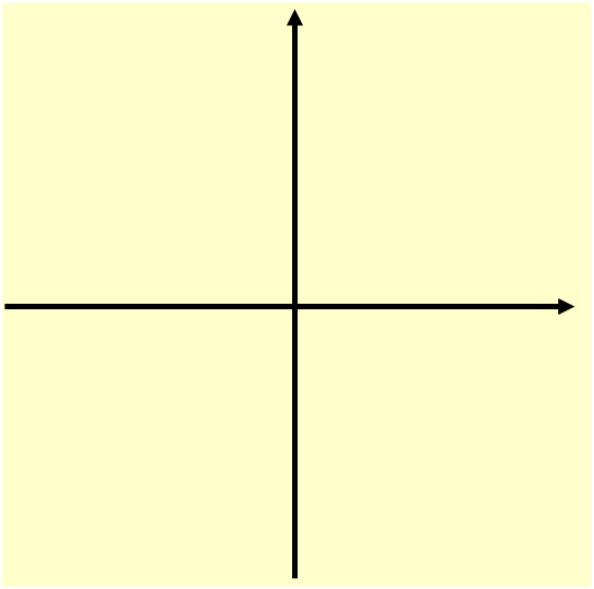


ii) $|z-4|=5$ and $Re(z)=0$

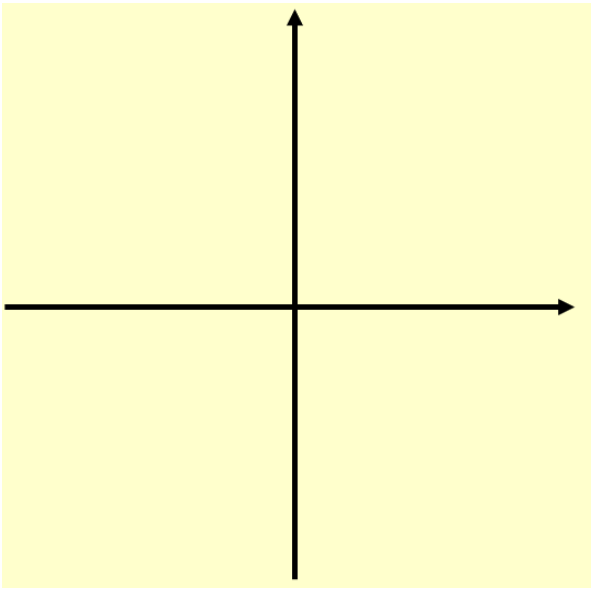


2. If $|z - 5 - 3i| = 3$

a) Sketch the locus of P(x,y) which is represented by z on an Argand diagram



b) Find the maximum value of argz in the interval (-π,π)

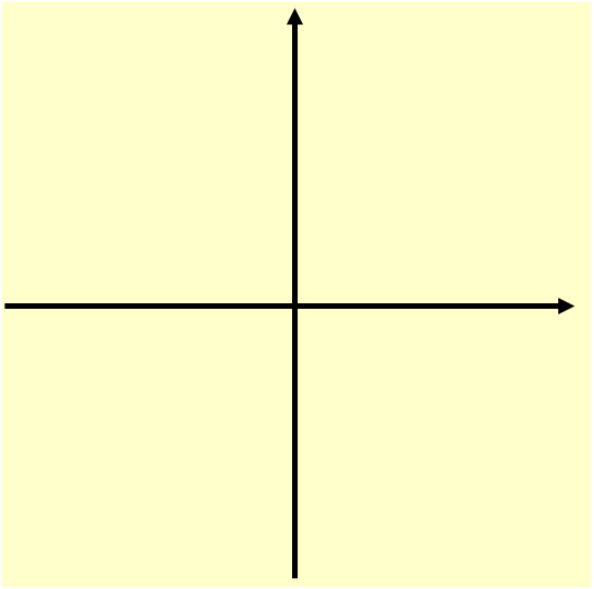


c) Use an algebraic method to find a Cartesian equation of the locus of z

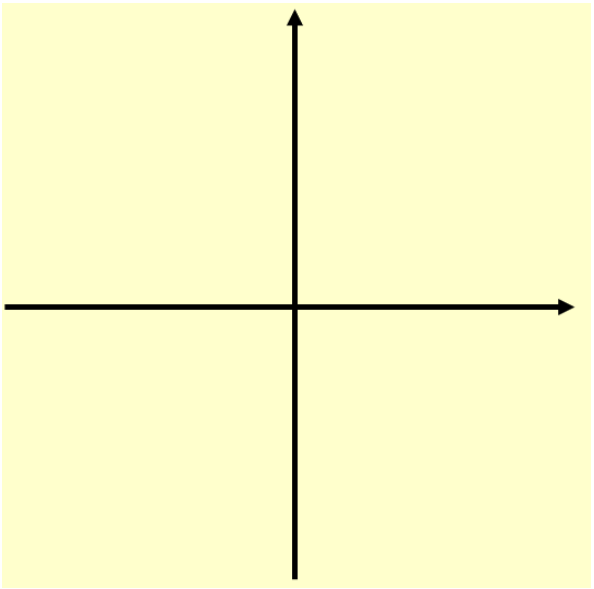
3. Given that the complex number z = x + iy satisfies the equation:

$$|z - 12 - 5i| = 3$$

Find the minimum and maximum values of |z|



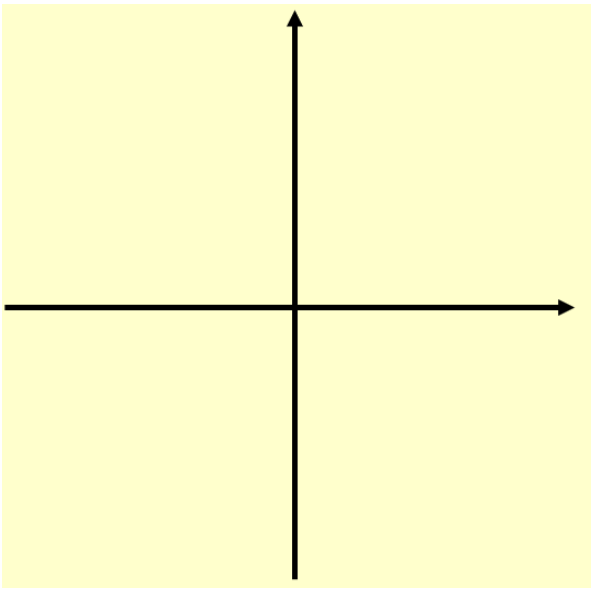
Notes on Loci for $|z-z_1|=|z-z_2|$



4. Sketch the locus of P(x,y) which is represented by z on an Argand diagram, if:

a)

$$|z| = |z - 6i|$$



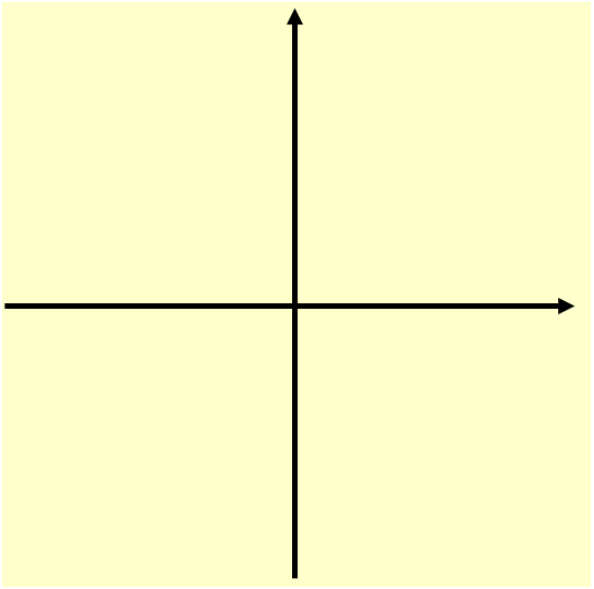
b) Show that the locus is y = 3 using an algebraic method

5.

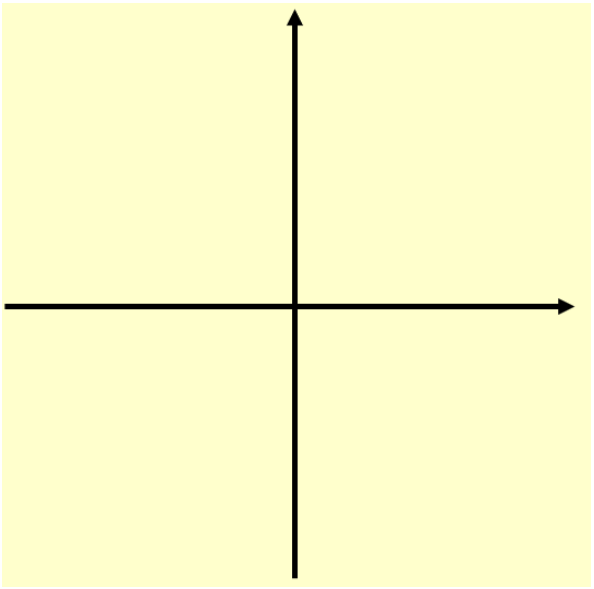
a) Use an algebraic method to find the Cartesian equation of the locus of z if:

$$|z - 3| = |z + i|$$

c) Represent the locus of z on a cartesian set of axes



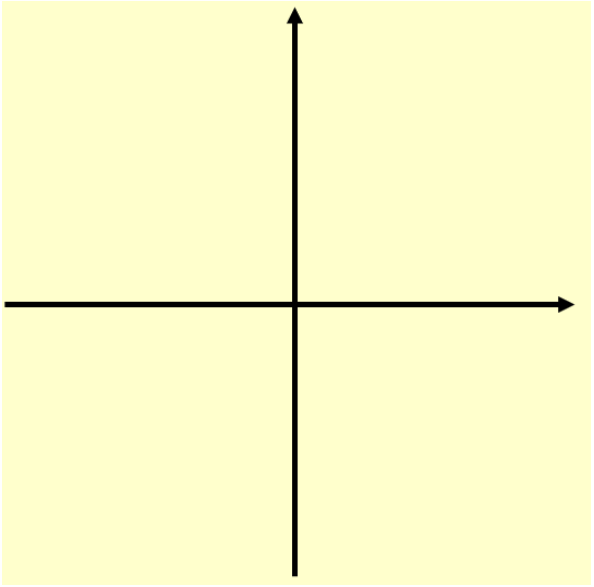
Notes on Loci for argz = ɵ



6. If

$$arg z = \frac{\pi}{4}$$

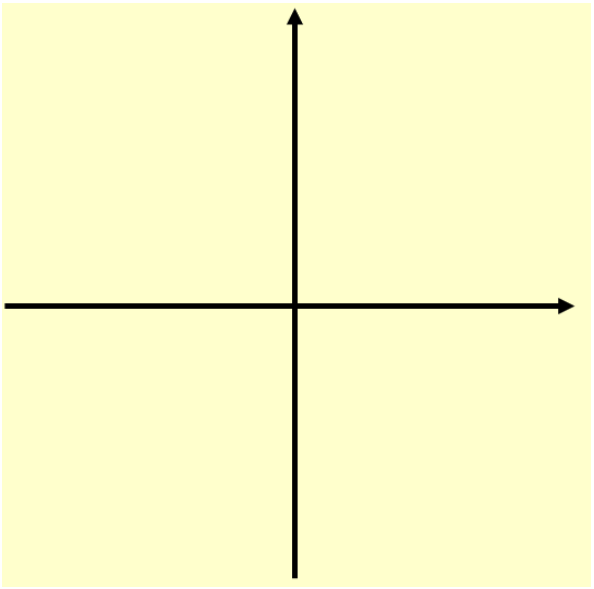
Sketch the locus of P(x,y) which is represented by z on an Argand diagram. Then find the Cartesian equation of this locus algebraically.



7. If

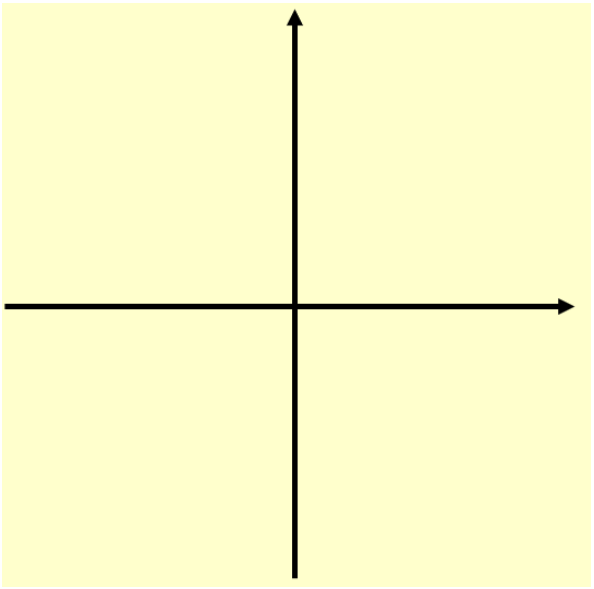
$$\arg(z-2)=\frac{\pi}{3}$$

Sketch the locus of P(x,y) which is represented by z on an Argand diagram. Then find the Cartesian equation of this locus algebraically.



8. If

$$arg(z + 3 + 2i) = \frac{3\pi}{4}$$



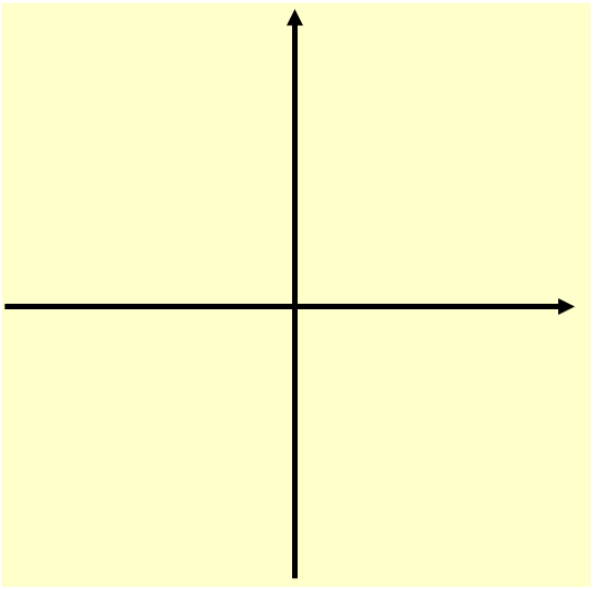
Sketch the locus of z on an Argand diagram and use an algebraic method to find the equation of the line.

2F Shading Regions on Argand Diagrams

1. Shade on an Argand diagram the region indicated by:

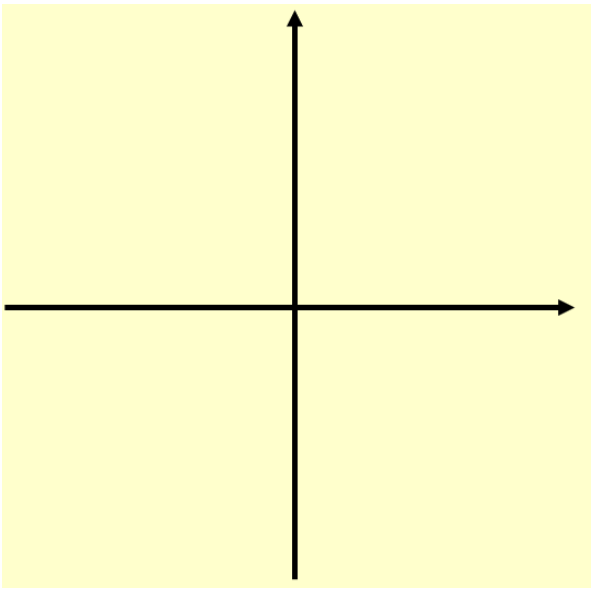
a)

$$|z - 4 - 2i| \leq 2$$



b)

$$|z - 4| < |z - 6|$$



c)

$$0 \leq arg(z - 2 - 2i) \leq \frac{\pi}{4}$$