3. Find the norm and the argument of each of the following complex numbers. Write each number in the polar form: (a) -1 + i   (b) -3 i

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Problem Solving - What are the terms/strategies I may need? What do I know?

Polar form is of the form z= r(cis(θ))
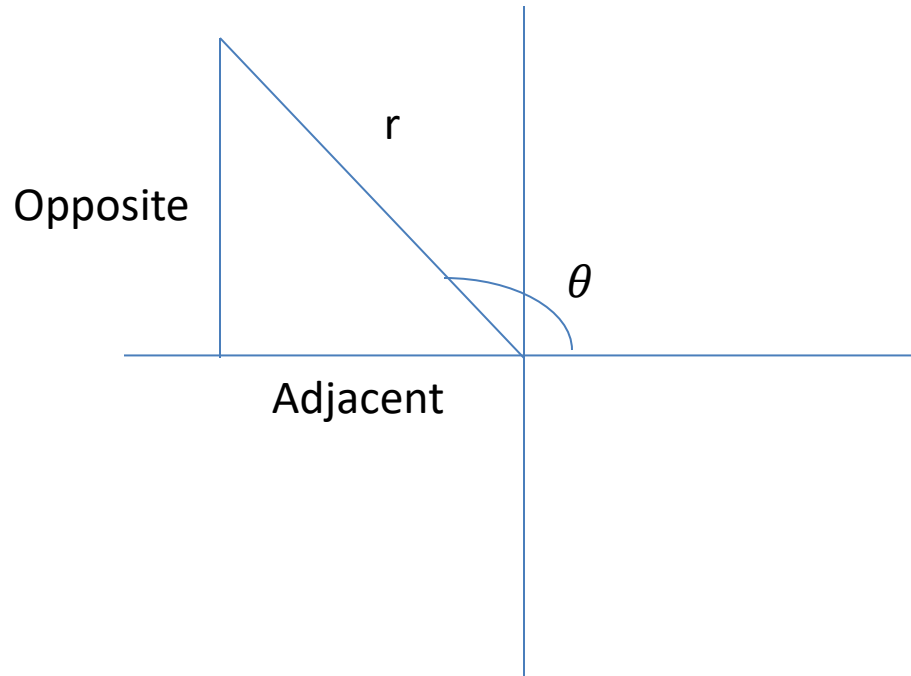Visualize with the figure on the right.

Remember: SOH CAH TOA

$$\sin \alpha = \frac{Opposite}{Hypothenus}$$

$$\cos \alpha = \frac{Adjacent}{Hypethenus}$$

$$\tan \alpha = \frac{Opposite}{Hypothenus}$$

Opposite

Adjacent

r

θ

where α represents the angle in radians within the triangle, and θ is the angle measured from the positive x-axis in radians.

Opposite, Hypotenuse, and Adjacent represents positive lengths of each side of the triangle.

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Steps & Process

Polar form is of the form z= r(cis(θ)) where r is the radius and θ is the angle.

a) (-1,1) when graphed on a complex plane. So, r=$\sqrt{1+1} = \sqrt{2}$
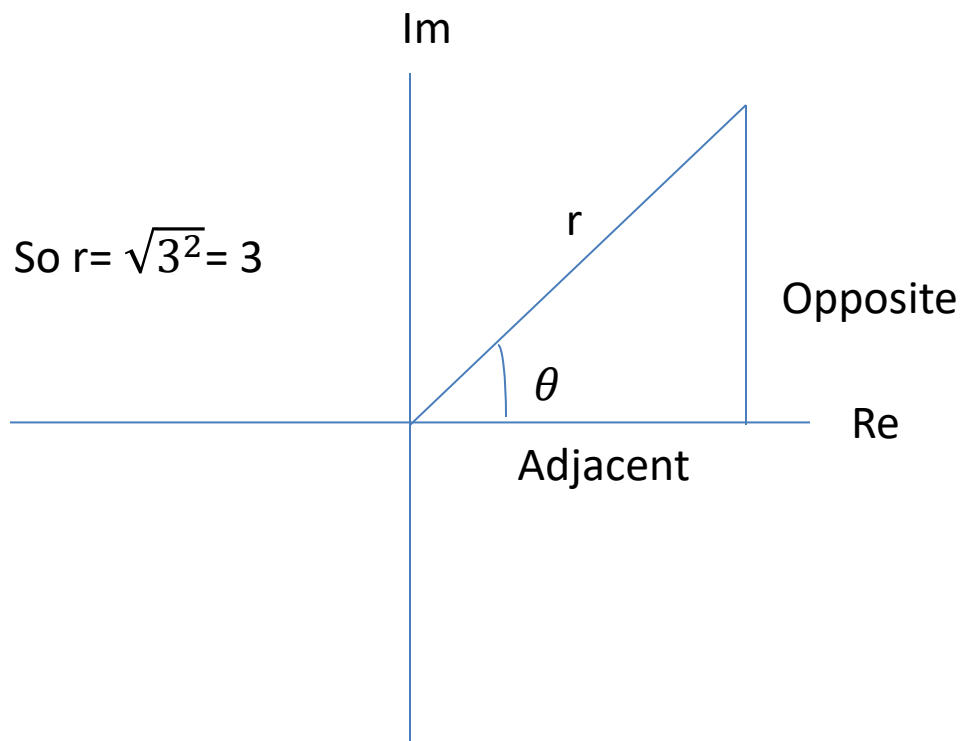
And α=$\tan^{-1}(1) = \frac{\pi}{4}$

Thus $\theta = \pi - \frac{\pi}{4} = \frac{3\pi}{4}$

So, $- 1 + i = \sqrt{2}(\text{cis}\frac{3\pi}{4})$

c) (0, -3) when graphed on a complex plane. So r= $\sqrt{3^2}$= 3

And $\theta = \frac{3\pi}{2}$

So, $- 3i = 3(\text{cis}\frac{3\pi}{2})$

Im

r

Opposite

θ

Re

Adjacent

3. Find the norm and the argument of each of the following complex numbers. Write each number in the polar form: (a) -1 + i   (b) -3 i

Solidify Understanding – Explain why the steps makes sense by connecting to math you know.

Why is polar form equal to standard form with complex numbers?

For Video Please click the link below:

Video