

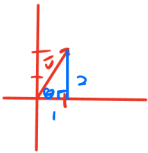
V4 - Component to Polar (Right Angles Trig)

Given a vector in component form, find the vector's polar form.

1. $\vec{v} = \langle 1, 2 \rangle$

(magnitude, θ)

$\vec{v} = (\sqrt{5}, 63^\circ)$

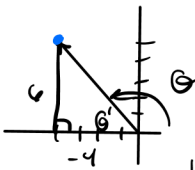


$$\begin{aligned} \|\vec{v}\| &= \sqrt{x^2 + y^2} \\ &= \sqrt{1^2 + 2^2} \\ &= \sqrt{1+4} \\ \|\vec{v}\| &= \sqrt{5} \end{aligned}$$

$$\begin{aligned} \tan \theta &= \frac{2}{1} \\ \theta &= \tan^{-1}(2) \\ \theta &= 63^\circ \end{aligned}$$

2. $\vec{u} = \langle -4, 6 \rangle$

$\vec{u} = (\sqrt{52}, 124^\circ)$



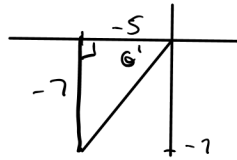
$$\begin{aligned} \|\vec{u}\| &= \sqrt{(-4)^2 + 6^2} \\ &= \sqrt{16+36} \\ \|\vec{u}\| &= \sqrt{52} \end{aligned}$$



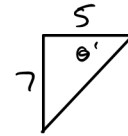
$$\begin{aligned} \tan \theta' &= \frac{6}{4} \\ \theta' &= \tan^{-1}\left(\frac{6}{4}\right) \\ \theta' &= 56^\circ \\ \theta &= 180^\circ - 56^\circ \\ \theta &= 124^\circ \end{aligned}$$

3. $\vec{w} = \langle -5, -7 \rangle$

$\vec{w} = (\sqrt{74}, 234^\circ)$



$$\begin{aligned} \|\vec{w}\| &= \sqrt{(-5)^2 + (-7)^2} \\ &= \sqrt{25+49} \\ \|\vec{w}\| &= \sqrt{74} \end{aligned}$$

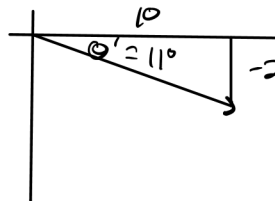


$$\begin{aligned} \tan \theta' &= \frac{7}{5} \\ \theta' &= \tan^{-1}\left(\frac{7}{5}\right) \\ \theta' &= 54^\circ \\ \theta &= 180^\circ + 54^\circ \\ \theta &= 234^\circ \end{aligned}$$

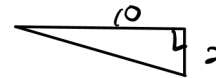
4. $\vec{s} = \langle 10, -2 \rangle$

$\vec{s} = (\sqrt{104}, 349^\circ)$

$\vec{s} = (\sqrt{104}, -11^\circ)$



$$\begin{aligned} \|\vec{s}\| &= \sqrt{10^2 + (-2)^2} \\ &= \sqrt{100+4} \\ &= \sqrt{104} \end{aligned}$$



$$\begin{aligned} \tan \theta' &= \frac{2}{10} \\ \theta' &= \tan^{-1}\left(\frac{2}{10}\right) \\ \theta' &= 11^\circ \\ \theta &= 360^\circ - 11^\circ \\ \theta &= 349^\circ \end{aligned}$$