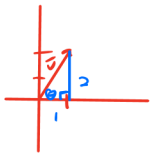
V4 - Component to Polar (Right Angles Trig)

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

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

(magnitude, θ)

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

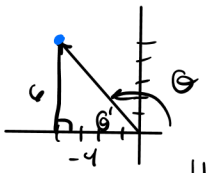


$||v|| = \sqrt{x^2+y^2}$
$= \sqrt{(1)^2+(2)^2}$
$= \sqrt{1+4}$
$||v|| = \sqrt{5}$

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

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

$\bar{u} = \langle \sqrt{52}, 124^\circ \rangle$



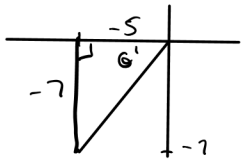
$||\bar{u}|| = \sqrt{(-4)^2+(6)^2}$
$= \sqrt{16+36}$
$||\bar{u}|| = \sqrt{52}$

$\tan\theta' = \frac{6}{4}$
$\theta' = \tan^{-1}(\frac{6}{4})$
$\theta' = 56^\circ$

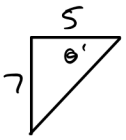
$\theta = 180 - 56^\circ$
$\theta = 124^\circ$

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

$\bar{w} = \langle \sqrt{74}, 234^\circ \rangle$



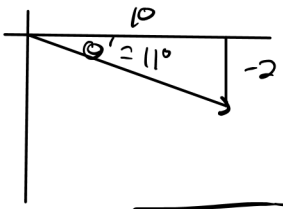
$||\bar{w}|| = \sqrt{(-5)^2+(-7)^2}$
$= \sqrt{25+49}$
$||\bar{w}|| = \sqrt{74}$



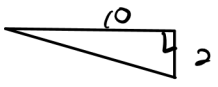
$\tan\theta' = \frac{7}{5}$
$\theta' = \tan^{-1}(\frac{7}{5})$
$\theta' = 54^\circ$
$\theta = 180^\circ + 54^\circ$
$\theta = 234^\circ$

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

$\bar{s} = \langle \sqrt{104}, 349^\circ \rangle$
$\bar{s} = \langle \sqrt{104}, -11^\circ \rangle$



$||\bar{s}|| = \sqrt{(10)^2+(-2)^2}$
$= \sqrt{100+4}$
$= \sqrt{104}$



$\tan\theta' = \frac{2}{10}$
$\theta' = \tan^{-1}(\frac{2}{10})$
$\theta' = 11^\circ$

$\theta = 360^\circ - 11^\circ$
$\theta = 349^\circ$