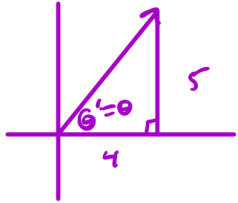


### V4 - Component to Polar (Right Triangle Trig)

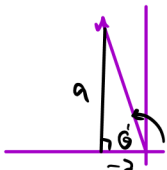
Given a vector in component form, find the vector's magnitude and direction (using an angle in standard position) and write the answer in polar form (magnitude, angle)

1.  $\vec{a} = \langle 4, 5 \rangle$   $\vec{a} = (\sqrt{41}, 51^\circ)$



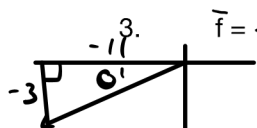
$$\begin{aligned} \|\vec{a}\| &= \sqrt{x^2 + y^2} \\ &= \sqrt{(4)^2 + (5)^2} \\ &= \sqrt{16 + 25} \\ &= \sqrt{41} \end{aligned} \quad \left| \begin{aligned} \tan \theta' &= \frac{5}{4} \\ \theta' &= \tan^{-1}\left(\frac{5}{4}\right) \\ \theta' &= 51^\circ \end{aligned} \right.$$

2.  $\vec{e} = \langle -2, 9 \rangle$   $\vec{e} = (\sqrt{85}, 103^\circ)$



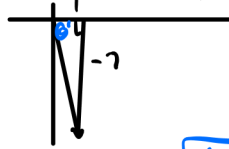
$$\begin{aligned} \|\vec{e}\| &= \sqrt{x^2 + y^2} \\ &= \sqrt{(-2)^2 + (9)^2} \\ &= \sqrt{4 + 81} \\ &= \sqrt{85} \end{aligned} \quad \left| \begin{aligned} \tan \theta' &= \frac{9}{2} \\ \theta' &= \tan^{-1}\left(\frac{9}{2}\right) \\ \theta' &= 77^\circ \\ \theta &= 180^\circ - 77^\circ \\ \theta &= 103^\circ \end{aligned} \right.$$

3.  $\vec{f} = \langle -11, -3 \rangle$   $\vec{f} = (\sqrt{130}, 195^\circ)$



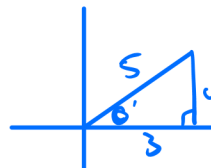
$$\begin{aligned} \|\vec{f}\| &= \sqrt{(-11)^2 + (-3)^2} \\ &= \sqrt{121 + 9} \\ &= \sqrt{130} \end{aligned} \quad \left| \begin{aligned} \tan \theta' &= \frac{3}{11} \\ \theta' &= \tan^{-1}\left(\frac{3}{11}\right) \\ \theta' &= 15^\circ \\ \theta &= 180^\circ + 15^\circ = 195^\circ \end{aligned} \right.$$

4.  $\vec{m} = \langle 1, -7 \rangle$   $\vec{m} = (\sqrt{50}, -82^\circ) = (\sqrt{50}, 278^\circ)$



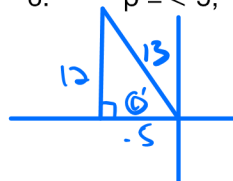
$$\begin{aligned} \|\vec{m}\| &= \sqrt{(1)^2 + (-7)^2} \\ &= \sqrt{1 + 49} \\ &= \sqrt{50} \end{aligned} \quad \left| \begin{aligned} \tan \theta' &= \frac{7}{1} \\ \theta' &= \tan^{-1}(7) \\ \theta' &= 82^\circ \end{aligned} \right.$$

5.  $\vec{n} = \langle 3, 4 \rangle$   $\vec{n} = (5, 53^\circ)$



$$\begin{aligned} \frac{PT}{3-4-5} \quad \tan \theta &= \frac{4}{3} \\ \theta &= \tan^{-1}\left(\frac{4}{3}\right) \\ \theta &= 53^\circ \end{aligned}$$

6.  $\vec{p} = \langle -5, 12 \rangle$   $\vec{p} = (13, 113^\circ)$



$$\begin{aligned} \frac{PT}{5-12-13} \quad \tan \theta' &= \frac{12}{5} \\ \theta' &= \tan^{-1}\left(\frac{12}{5}\right) \\ \theta' &= 67^\circ \\ \theta &= 180^\circ - 67^\circ \\ \theta &= 113^\circ \end{aligned}$$