Answer on Question #45120 – Math – Calculus

Determine two pairs of polar coordinates for the point $(-4,4)$ with $0° \leq \theta < 360°$.

Solution

The Cartesian coordinates x and y can be converted to polar coordinates ρ and θ by:

$\rho = \sqrt{x^2 + y^2}, sin\theta = \frac{y}{\sqrt{x^2+y^2}}, cos\theta = \frac{x}{\sqrt{x^2+y^2}}.$

Then:

$$\rho = \sqrt{(-4)^2 + 4^2} = \sqrt{32} = 4\sqrt{2}$$

$$sin\theta = \frac{4}{\sqrt{(-4)^2 + 4^2}} = \frac{1}{\sqrt{2}}$$

$$cos\theta = \frac{-4}{\sqrt{(-4)^2 + 4^2}} = -\frac{1}{\sqrt{2}}$$

$$\theta = arcsin\frac{1}{\sqrt{2}} = \frac{\pi}{4} = 45°$$

$$\theta = arcos\left(-\frac{1}{\sqrt{2}}\right) = \frac{3\pi}{4} = 135°$$

Answer: two pairs of polar coordinates for the point $(-4,4)$: $(4\sqrt{2}, 45°)$ and $(4\sqrt{2}, 135°)$.