

Questions

Example Plot the point whose polar coordinates are given. Then find two other pairs of polar coordinates of this point, one with $r > 0$ and one with $r < 0$.

(a) $\left(1, \frac{\pi}{2}\right)$ (b) $\left(-2, \frac{\pi}{4}\right)$ (c) $(3, 2)$

Example Plot the point whose polar coordinates are given. Then find the Cartesian coordinates of that point.

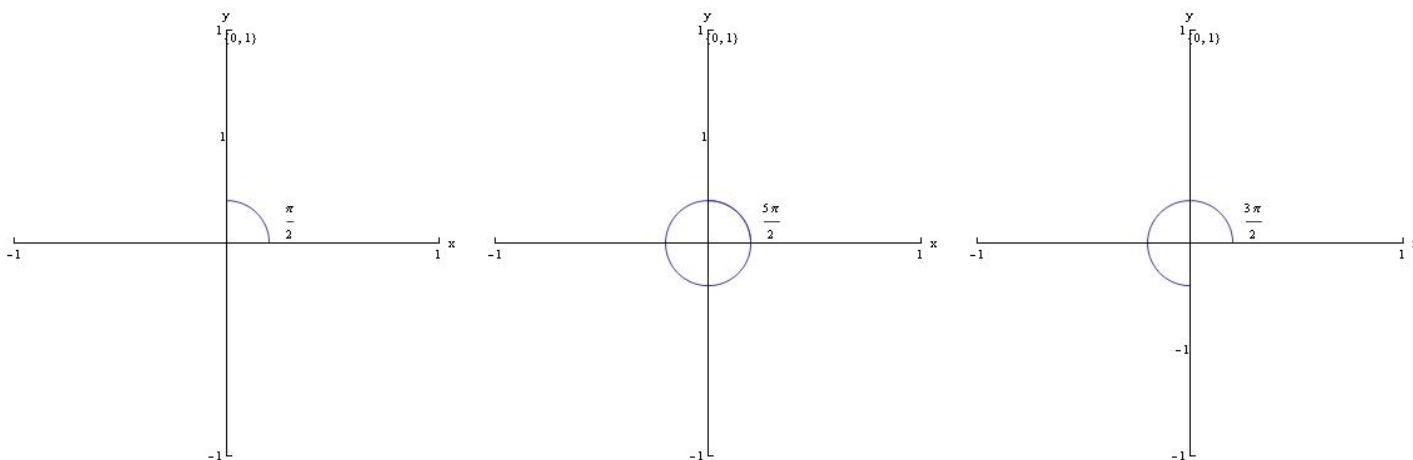
Example Find a Cartesian equation for the curve described by the polar equation $r^2 = \sin 2\theta$.

Solutions

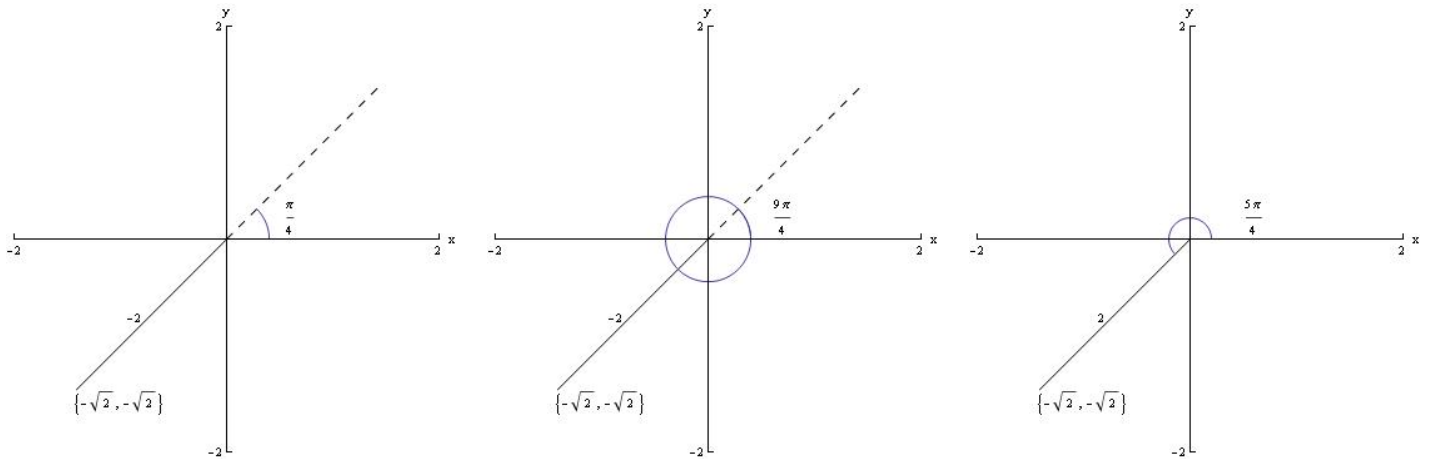
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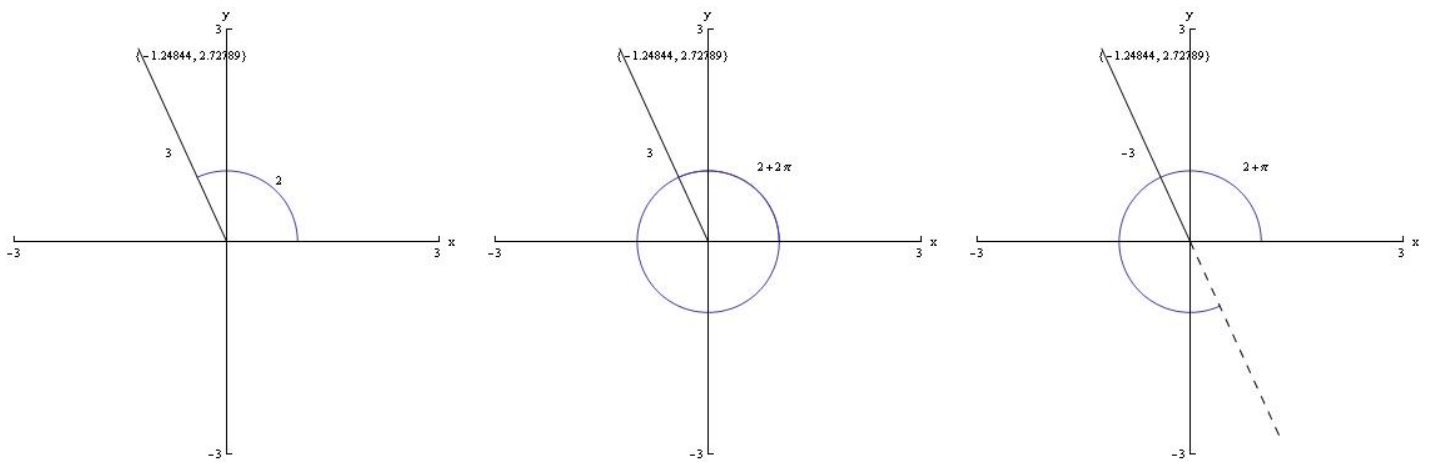
(a) The Cartesian equivalent is $x = 0, y = 1$. This point can also be written in polar coordinates as $\left(1, \frac{5\pi}{2}\right), \left(-1, \frac{3\pi}{2}\right)$.



(b) The Cartesian equivalent is $x = -\sqrt{2}, y = -\sqrt{2}$. This point can also be written in polar coordinates as $\left(-2, \frac{9\pi}{4}\right), \left(2, \frac{5\pi}{4}\right)$.

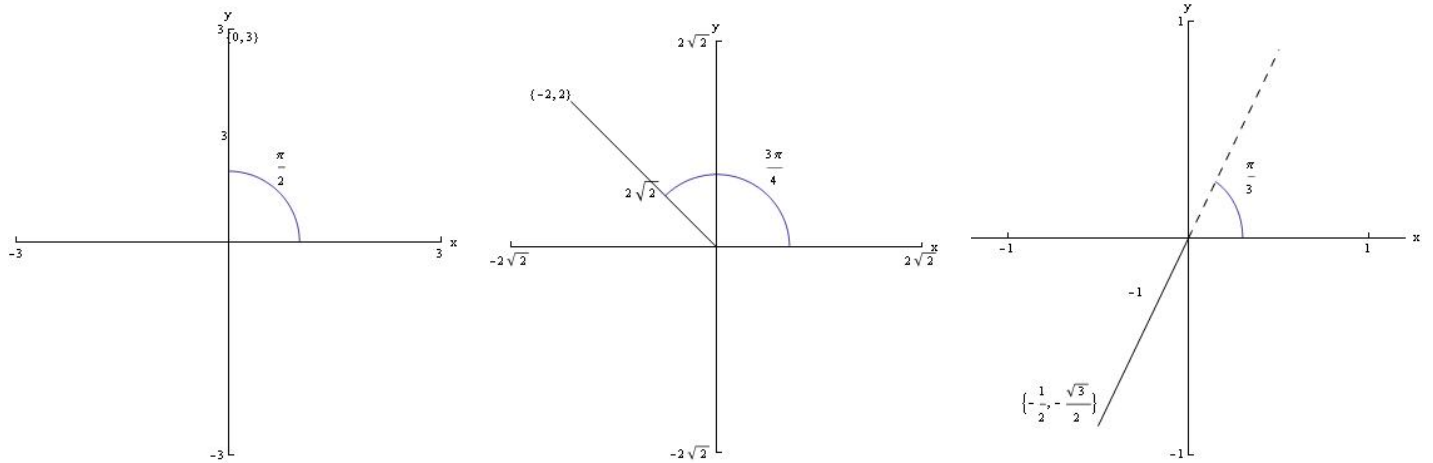


(c) The Cartesian equivalent is $x = -1.248$, $y = 2.727$. This point can also be written in polar coordinates as $(3, 2 + 2\pi)$, $(-3, 2 + \pi)$.



Example Plot the point whose polar coordinates are given. Then find the Cartesian coordinates of that point.

(a) $\left(3, \frac{\pi}{2}\right)$ (b) $\left(2\sqrt{2}, \frac{3\pi}{4}\right)$ (c) $\left(-1, \frac{\pi}{3}\right)$



Example Find a Cartesian equation for the curve described by the polar equation $r^2 = \sin 2\theta$.

$$\begin{aligned}
 r^2 &= \sin 2\theta \\
 x^2 + y^2 &= 2 \sin \theta \cos \theta \\
 x^2 + y^2 &= 2 \left(\frac{y}{r}\right) \left(\frac{x}{r}\right) \\
 r^2(x^2 + y^2) &= 2xy \\
 (x^2 + y^2)(x^2 + y^2) &= 2xy \\
 (x^2 + y^2)^2 &= 2xy
 \end{aligned}$$