Warm up

1. Name 3 other polar coordinates for the one given within the given parameters:

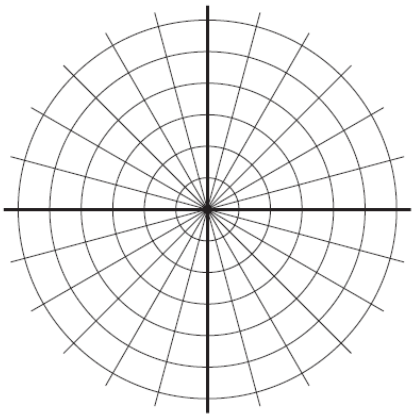
$\left(2, \frac{3\pi}{4}\right)$

a. $r < 0,\ 0 \le \theta < 2\pi$

b. $r > 0,\ 2\pi \le \theta < 4\pi$

c. $r > 0,\ -2\pi \le \theta < 0$

a) $\left(-2, \frac{7\pi}{4}\right)$
b) $\left(2, \frac{11\pi}{4}\right)$
c) $\left(2, -\frac{5\pi}{4}\right)$



2. Convert the polar coordinate to a rectangular coordinate. $\left(-3, \frac{11\pi}{6}\right)$ Q2

$\left(-3\cos\frac{11\pi}{6}, -3\sin\frac{11\pi}{6}\right)$

$\left(-\frac{3\sqrt{3}}{2}, \frac{1}{2}\right)$

3. Convert the rectangular coordinate to a polar coordinate. $\left(\sqrt{3}, -1\right)$ Q4

$r = \sqrt{3+1} = 2$ $\quad \tan\theta = \frac{-1}{\sqrt{3}}$

$RA\theta = \frac{\pi}{6} \Rightarrow \theta = \frac{11\pi}{6}$ $\quad \left(2, \frac{11\pi}{6}\right)$

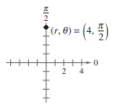
Apr 23-9:05 AM

GO COUGARS!

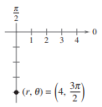
Homework Questions

In Exercises 1–4, a point in polar coordinates is given. Find the corresponding rectangular coordinates for the point.

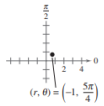
1. $\left(4, \frac{\pi}{2}\right)$



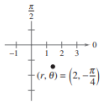
2. $\left(4, \frac{3\pi}{2}\right)$



3. $\left(-1, \frac{5\pi}{4}\right)$



4. $\left(2, -\frac{\pi}{4}\right)$



In Exercises 5–12, plot the point given in polar coordinates and find three additional polar representations of the point, using $-2\pi < \theta < 2\pi$.

5. $\left(3, \frac{5\pi}{6}\right)$
6. $\left(2, \frac{3\pi}{4}\right)$
7. $\left(-1, -\frac{\pi}{3}\right)$
8. $\left(-3, -\frac{7\pi}{6}\right)$
9. $\left(\sqrt{3}, \frac{5\pi}{6}\right)$
10. $\left(5\sqrt{2}, -\frac{11\pi}{6}\right)$
11. $\left(\frac{3}{2}, -\frac{3\pi}{2}\right)$
12. $\left(0, -\frac{\pi}{4}\right)$

In Exercises 13–20, plot the point given in polar coordinates and find the corresponding rectangular coordinates for the point.

13. $\left(4, -\frac{\pi}{3}\right)$
14. $\left(2, \frac{7\pi}{6}\right)$
15. $\left(-1, -\frac{3\pi}{4}\right)$
16. $\left(-3, -\frac{2\pi}{3}\right)$
17. $\left(0, -\frac{7\pi}{6}\right)$
18. $\left(0, \frac{5\pi}{4}\right)$

In Exercises 29–36, plot the point given in rectangular coordinates and find *two* sets of polar coordinates for the point for $0 \le \theta < 2\pi$.

29. $(-7, 0)$
30. $(0, -5)$
31. $(1, 1)$
32. $(-3, -3)$
33. $(-\sqrt{3}, -\sqrt{3})$
34. $(\sqrt{3}, -1)$

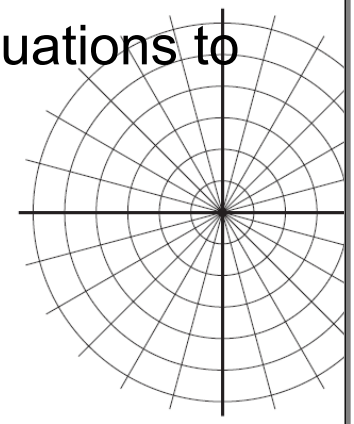
Feb 2-9:51 PM

9.6 Day 2

Conversions of non-common angles

Converting Polar Equations to Rectangular Equations

Converting Rectangular Equations to Polar Equations



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polar to rectangular

$(5,177°)$

Use $x = r\cos\theta$, $y = r\sin\theta$

$(5\cos 177, 5\sin 177)$

$(-4.99, 0.26)$

rectangular to polar

(-4,-5) Q3

Use $r = \sqrt{x^2 + y^2}$, $\tan\theta = \frac{y}{x}$

$\sqrt{16+25} = \sqrt{41}$

$\tan\theta = \frac{5}{4}$

$(\theta = 51.34°)$

$(6.4, 231.34°)$

$(\sqrt{41}, 231.34°)$

or

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Converting Polar equations to Rectangular

$r = -2$

square both sides

$r^2 = 4$

$x^2 + y^2 = 4$

Circle $m(0,0)$ $r=2$

$x^2 + y^2 = r^2$

$x = r\cos\theta$

$y = r\sin\theta$

use these for your conversions

$r = -2\sin\theta$

multiply both sides by r

$r \cdot r = -2r\sin\theta$

$r^2 = -2r\sin\theta$

$x^2 + y^2 = -2y$

complete the square

$x^2 + (y^2 + 2y + 1) = 1$

$x^2 + (y+1)^2 = 1$

Circle $m(0,-1)$ $r=1$

$\theta = \frac{\pi}{6}$

$\tan\theta = \tan\frac{\pi}{6}$

$\frac{\sin\theta}{\cos\theta} = \frac{1}{\sqrt{3}}$

$\frac{r\sin\theta}{r\cos\theta} = \frac{1}{\sqrt{3}}$

$\frac{y}{x} = \frac{1}{\sqrt{3}}$

$y = \frac{1}{\sqrt{3}}x$

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$r = -3\cos\theta - 2\sin\theta$

$r \cdot r = -3r\cos\theta - 2r\sin\theta$

$x^2 + y^2 = -3x - 2y$

$(x^2 + 3x + \frac{3}{2}^2) + (y^2 + 2y + 1^2) = 0 + \frac{9}{4} + 1$

$(x + \frac{3}{2})^2 + (y+1)^2 = \frac{13}{4}$

Circle $m(-\frac{3}{2}, -1)$ $r = \frac{\sqrt{13}}{2}$

$r = 3\sec\theta$

$r = \frac{3}{\cos\theta}$

multiply by $\cos\theta$

$r\cos\theta = 3$

$x = 3$

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Rectangular to Polar

x=2

$r\cos\theta = 2$

$r = \frac{2}{\cos\theta}$

$r = 2\sec\theta$

Get in terms of r=

2x-3y=5

$2r\cos\theta - 3r\sin\theta = 5$

factor gcf $r(2\cos\theta - 3\sin\theta) = 5$

$r = \frac{5}{2\cos\theta - 3\sin\theta}$

Apr 19-10:00 AM

Rectangular to Polar

$(x-3)^2 + y^2 = 9$

$x^2 - 6x + 9 + y^2 = 9$

$r^2 - 6x = 0$

$r^2 - 6r\cos\theta = 0$

$r^2 = 6r\cos\theta$

divide by r $r = 6\cos\theta$

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