Polar Coordinates

LarTrig9 6.7.001. (2456655) (Add) -- view 1m
Comment: not randomized

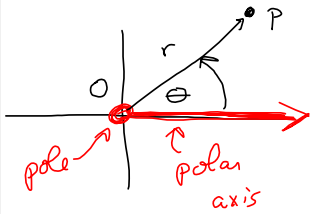
Fill in the blank.

The origin of the polar coordinate system is called the ---Select--- pole

LarTrig9 6.7.002. (2456479) (Add) -- view 1m
Comment: not randomized

Fill in the blanks.

For the point (r, θ), r is the ---Select--- directed distance from O to P and θ is the ---Select--- directed angle counterclockwise from the polar axis to the line segment $\overline{OP}$.



LarTrig9 6.7.003. (2456763) (Add) -- view 1m
Comment: not randomized

Fill in the blank.

To plot the point (r, θ), use the ---Select--- polar coordinate system.

LarTrig9 6.7.004. (2456608) (Add) -- view 4m
Comment: not randomized

Fill in the blanks.

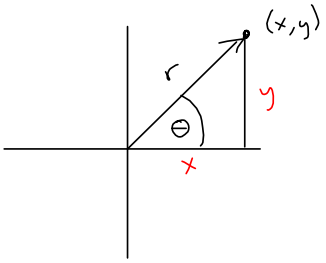
The polar coordinates (r, θ) are related to the rectangular coordinates (x, y) as follows:

$x =$ ____ $r\cos(\theta)$

$y =$ ____ $r\sin(\theta)$

$\tan\theta =$ ____ $\frac{y}{x}$

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



$\frac{x}{r} = \cos\theta \Rightarrow x = r\cos\theta$

$y = r\sin\theta$

$\tan\theta = \frac{y}{x}$

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

some ambiguity arising from

$\sqrt{r^2} = \sqrt{x^2+y^2}$

$\Rightarrow |r| = \sqrt{x^2+y^2}$

$\Rightarrow r = \pm\sqrt{x^2+y^2}$, & we handle this carefully.

WARNING!

$\theta = \arctan\left(\frac{y}{x}\right)$ only in QI, QIV.

In QII, QIII, you have to do a picture & some reasoning.

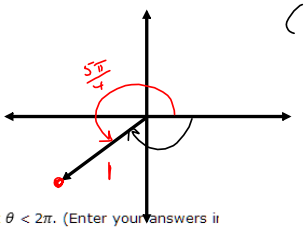
#5

LarTrig9 6.7.006. (2456835) (Add) -- view

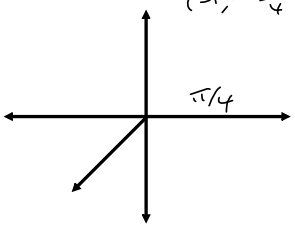
Comment: slightly modified

Plot the point given in polar coordinates.

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



$\left(1, -\frac{3\pi}{4}\right)$, $\left(-1, \frac{\pi}{4}\right)$, $\left(-1, -\frac{7\pi}{4}\right)$



Find three additional polar representations of the point, using $-2\pi < \theta < 2\pi$. (Enter your answers in order from smallest to largest first by r-value, then by θ-value.)

$(r, \theta) =$ ( ) -1, ( ) $\frac{-7\pi}{4}$

$(r, \theta) =$ ( ) -1, ( ) $\frac{\pi}{4}$

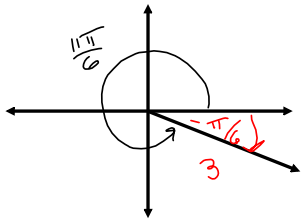
$(r, \theta) =$ ( ) 1, ( ) $\frac{-3\pi}{4}$

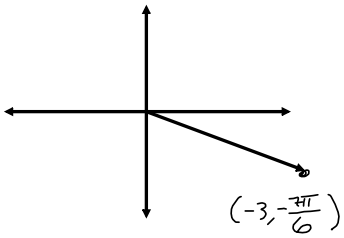
#6

LarTrig9 6.7.008. (2456242) (Add) -- view

Plot the point given in polar coordinates.

$\left(-3, -\frac{7\pi}{6}\right)$





Find three additional polar representations of the point, using $-2\pi < \theta < 2\pi$. (Enter your answers in order from smallest to largest first by r-value, then by θ-value.)

$(r, \theta) =$ ( ) -3, ( ) $5\frac{\pi}{6}$)

$(r, \theta) =$ ( ) 3, ( ) $-\frac{\pi}{6}$)

$(r, \theta) =$ ( ) 3, ( ) $11\frac{\pi}{6}$)

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

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

$\left(-3, \frac{5\pi}{6}\right)$

#7

LarTrig9 6.7.016. (2456257) (Add) -- view

Comment: slightly modified

Plot the point given in polar coordinates.

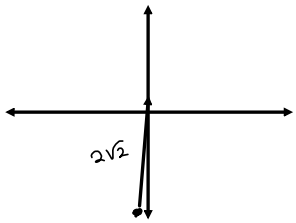
$(2\sqrt{2}, 4.71)$

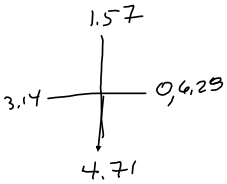
Find three additional polar representations of the point, using $-2\pi < \theta < 2\pi$. (Enter your answers in order from smallest to largest first by r-value, then by θ-value.)

$(r, \theta) = (\quad, -2\sqrt{2}, \quad, -4.71)$

$(r, \theta) = (\quad, -2\sqrt{2}, \quad, 1.57)$

$(r, \theta) = (\quad, 2\sqrt{2}, \quad, -1.57)$





$(-2\sqrt{2}, 1.57)$

$(2\sqrt{2}, -1.57)$

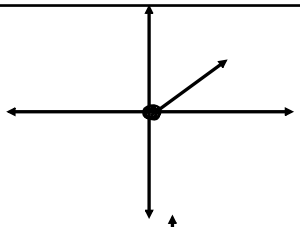
$(-2\sqrt{2}, -4.71)$

#8 LarTrig9 6.7.020. (2524450) (Add) -- view

A point in polar coordinates is given. Convert the point to rectangular coordinates.

$(0, -\pi)$ → $(0, 0)$

$(x, y) = (\boxed{}\ 0\ ,\ \boxed{}\ 0\ )$

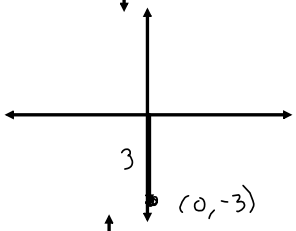


#9 LarTrig9 6.7.022.MI. (2524369) (Add) -- view

A point in polar coordinates is given. Convert the point to rectangular coordinates.

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

$(x, y) = (\boxed{}\ 0\ ,\ \boxed{}\ -3\ )$

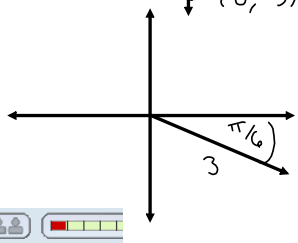


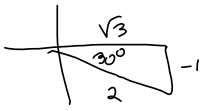
#10 LarTrig9 6.7.028.MI. (2456644) (Add) -- view

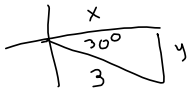
A point in polar coordinates is given. Convert the point to rectangular coordinates.

$\left(-3, \frac{5\pi}{6}\right)$

$(x, y) = (\boxed{}\ \frac{3\sqrt{3}}{2}\ ,\ \boxed{}\ -\frac{3}{2}\ )$







$y = 3\sin\left(-\frac{\pi}{6}\right)$

$= 3 \cdot \left(-\frac{1}{2}\right) = -\frac{3}{2}$

$x = 3\cos\left(-\frac{\pi}{6}\right)$

$= 3\,\frac{\sqrt{3}}{2}$

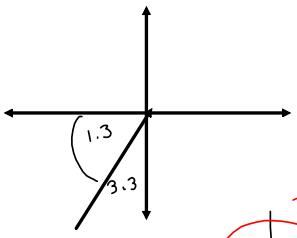
$(x, y) = \left(\frac{3\sqrt{3}}{2}, -\frac{3}{2}\right)$

#11 LarTrig9 6.7.033. (2524368) (Add) -- view

A point in polar coordinates is given. Convert the point to rectangular coordinates. (Round your answers to two decimal places.)

$(-3.3, 1.3)$

$(x, y) = (\boxed{}\ -0.88\ ,\ \boxed{}\ -3.18\ )$



$(3.3, \pi + 1.3)$

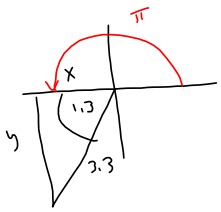
$y = 3.3\sin(\pi + 1.3)$

≈ -3.18

$x = 3.3\cos(\pi + 1.3)$

$\approx -.88$

$(-.88, -3.18)$




```
3.3sin(π+1.3)
     -3.179742012
3.3sin(1.3)
      3.179742012
3.3cos(π+1.3)
     -.8827461345
```

≈ -3.18

$\approx x$

If you just put in $\theta = 1.3$, you need to make this negative, due to its being in QIII.

#12

LarTrig9 6.7.071. (2534694) (Add) -- view

Convert the rectangular equation to polar form.

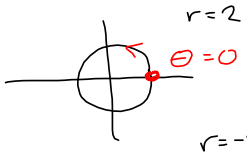
$x^2 + y^2 = 4$

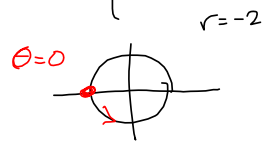
$r = 2$

$r^2 = 4 \Rightarrow |r| = 2 \Rightarrow r = \pm 2$

$r = -2$

$r = +2$ the main one





#13

LarTrig9 6.7.073.MI. (2456642) (Remove) -- view

Comment: not randomized

theta for θ as necessary.)

Convert the rectangular equation to polar form.

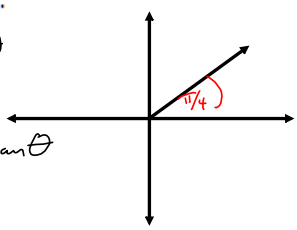
$y = x$

$\theta = \frac{\pi}{4}$

$r\sin\theta = r\cos\theta$

$\sin\theta = \cos\theta$

$\frac{\sin\theta}{\cos\theta} = 1 = \tan\theta$

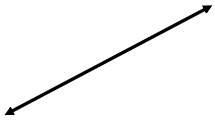


$\theta = \frac{\pi}{4}$

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

$\theta = -\frac{3\pi}{4}$

$\theta = -\frac{7\pi}{4}$



#4

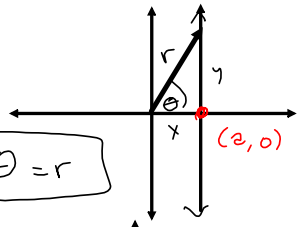
LarTrig9 6.7.076. (2534276) (Add) -- view

Convert the rectangular equation to polar form. Assume $a > 0$.

$x = a$ $\Rightarrow$ $r\cos\theta = a$

$r = a\sec(\theta)$

$r = \frac{a}{\cos\theta} = a\sec\theta = r$



$x = a$

$y = y$

$r = a\sec\theta$

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

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

$a\sec\theta = r$

#5

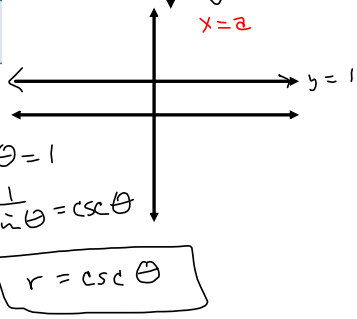
LarTrig9 6.7.077. (2456605) (Add) -- view

Comment: not randomized

Convert the rectangular equation to polar form. Assume $a > 0$.

$y = 1$

$r = \csc(\theta)$



$r\sin\theta = 1$

$r = \frac{1}{\sin\theta} = \csc\theta$

$r = \csc\theta$

#16

LarTrig9 6.7.079. (2534757) (Add) -- view

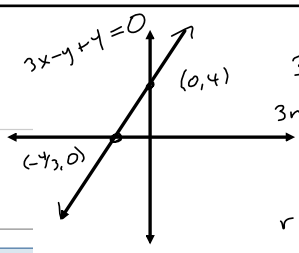
Convert the rectangular equation to polar form.

$3x - y + 4 = 0$

$r = -\dfrac{4}{3\cos(\theta) - \sin(\theta)}$

$y = 3x + 4$

x	y
0	4
$-\frac{4}{3}$	0



$3(r\cos\theta) - r\sin\theta + 4 = 0$

$3r\cos\theta - r\sin\theta = -4$

$r(3\cos\theta - \sin\theta) = -4$

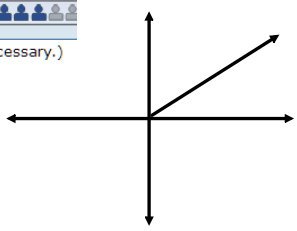
$r = \dfrac{-4}{3\cos\theta - \sin\theta}$

NA

LarTrig9 6.7.080. (2456161) (Add) -- view 5m

Convert the rectangular equation to polar form. (Use r and use theta for θ as necessary.)

$2x + 5y - 6 = 0$

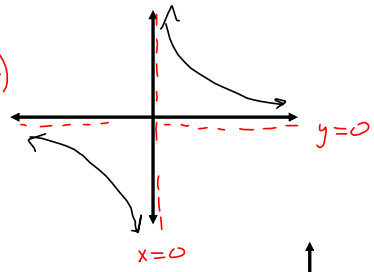


LarTrig9 6.7.081. (2534181) (Remove) -- view

#17 Convert the rectangular equation to polar form.

$xy = 10$ ⇒ $y = \frac{10}{x} = 10\left(\frac{1}{x}\right)$

$r^2 = 20\csc(2\theta)$



$r\cos\theta\, r\sin\theta = 10$

$r^2 = \frac{10}{\sin\theta\cos\theta} = \frac{20}{2\sin\theta\cos\theta}$

$= \frac{20}{\sin(2\theta)} = 2\csc(2\theta)$

$= r$

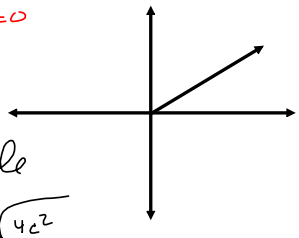
#18

LarTrig9 6.7.084.MI. (2456765) (Add) -- view

Convert the rectangular equation to polar form. Assume $c > 0$.

$x^2 + y^2 = 4c^2$

$r = 2c$



Plainly a circle of radius $\sqrt{4c^2}$

$= 2|c| = 2c$, as $c > 0$ was given.

$r^2 = 4c^2$

$|r| = 2|c|$

$|r| = 2c$

$r = 2c$ on "main branch"

$r = -2c$ on "not-main branch"

LarTrig9 6.7.085. (2534232) (Remove) -- view

Convert the rectangular equation to polar form. Assume $a > 0$.

#16

$x^2 + y^2 - 2ax = 0$

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

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

$r = 2a\cos\theta$

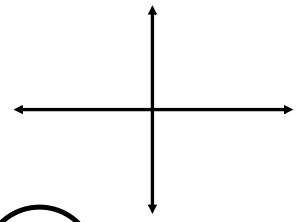
$x^2 - 2ax + a^2 + y^2 = 0 + a^2$

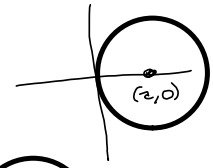
$\left(\frac{2a}{2}\right)^2 = a^2$

$(x-a)^2 + y^2 = a^2$

$(a, 0)$

$r = a$





$r = 2a\sin\theta$