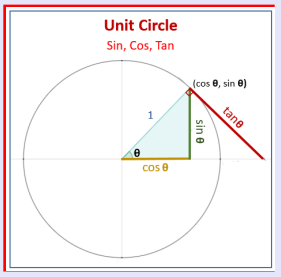
Trigonometry

Lecture 48

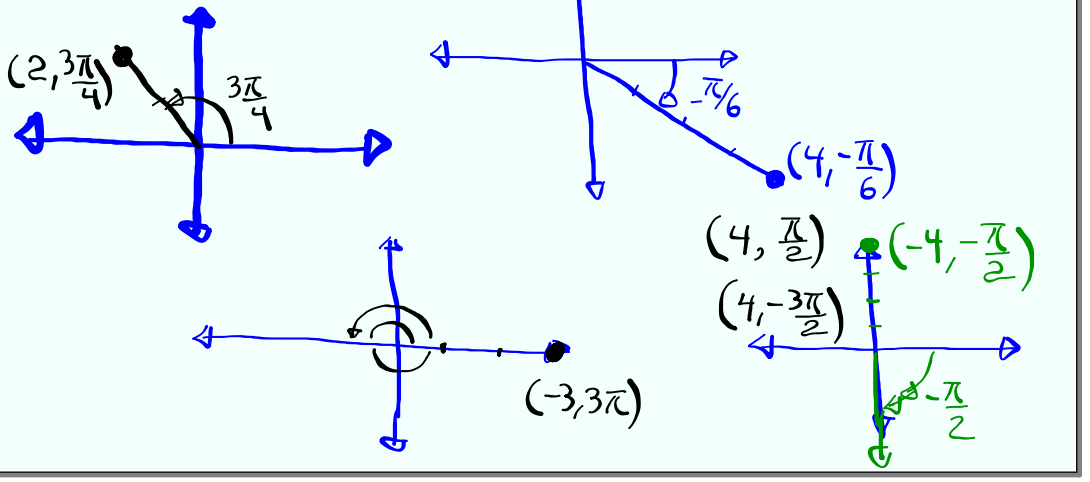


Feb 19-8:47 AM

More on Polar Coordinates

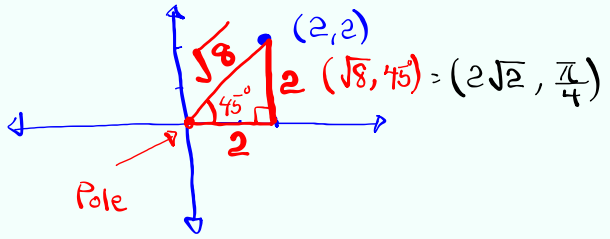
Plot $(2, \frac{3\pi}{4})$, $(4, \frac{-\pi}{6})$, $(-3, 3\pi)$, $(-4, -\frac{\pi}{2})$

r θ



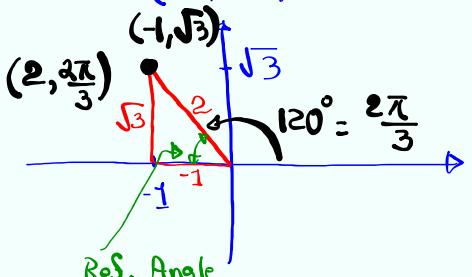
Nov 26-10:26 AM

Plot (2,2) in rectangular Coordinates



$(\sqrt{8}, 45^\circ) = (2\sqrt{2}, \frac{\pi}{4})$

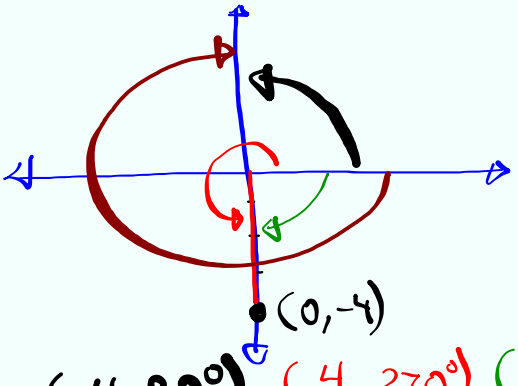
Plot $(-1, \sqrt{3})$ in rectangular Coordinates



$\tan RA = \frac{\sqrt{3}}{1}$ $RA = \tan^{-1}\sqrt{3} = 60^\circ = \frac{\pi}{3}$

Nov 26-10:32 AM

Plot (0,-4) in rectangular Coordinates



$(-4, 90^\circ)$ $(4, 270^\circ), (4, -90^\circ)$ $(-4, -270^\circ)$

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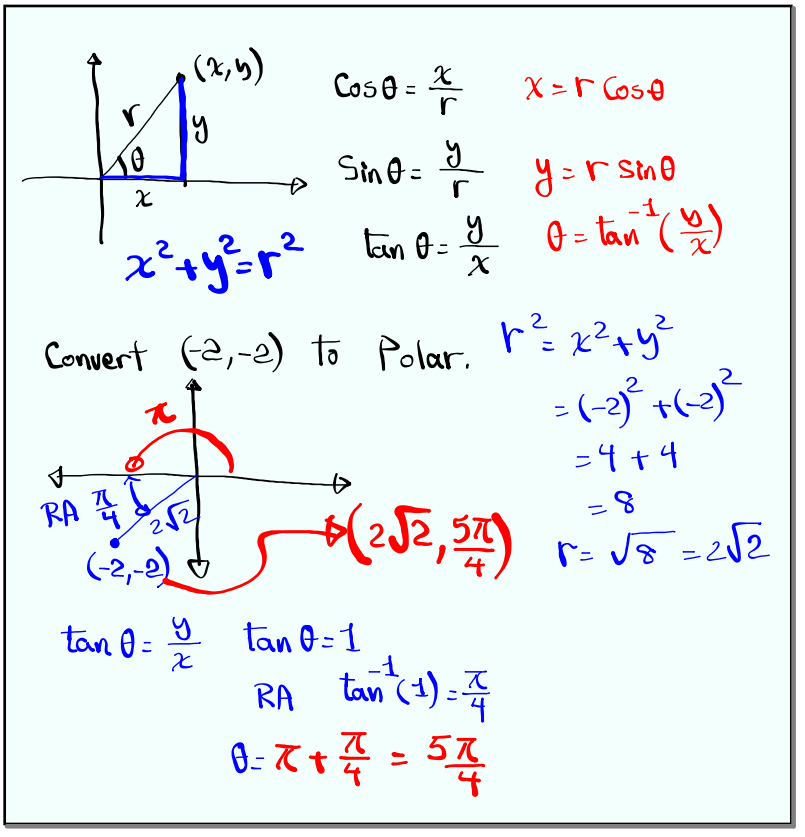

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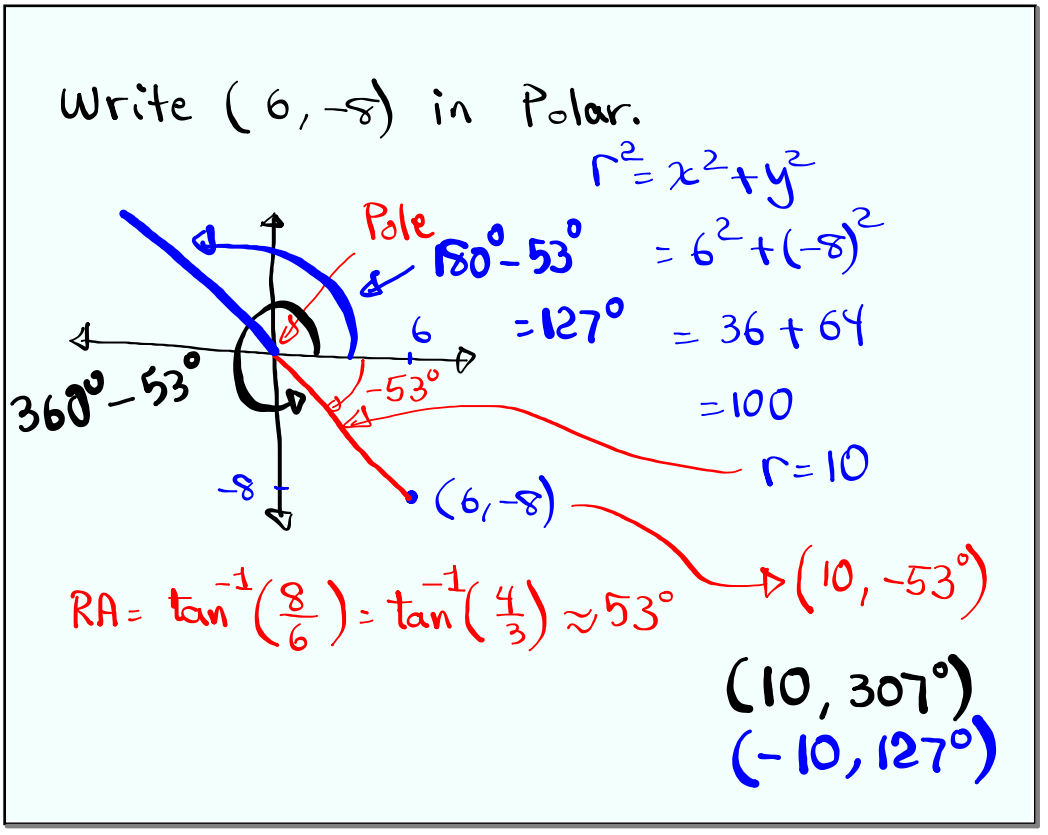


Nov 26-10:46 AM

Polar Equation $\Longleftrightarrow$ Rectangular Equation

r & θ $\qquad$ x & y

Convert $y^2 = 4x$ to Polar eqn.

$(r\sin\theta)^2 = 4(r\cos\theta)$

$r^2\sin^2\theta = 4r\cos\theta$

Divide by r, $r \neq 0$

$r\sin^2\theta = 4\cos\theta \qquad r = \dfrac{4\cos\theta}{\sin^2\theta}$

$r = 4 \cdot \dfrac{\cos\theta}{\sin\theta} \cdot \dfrac{1}{\sin\theta}$

$\boxed{r = 4\cot\theta\csc\theta}$

Nov 26-10:51 AM

Convert $r = 2 + 2\cos\theta$ to rectangular

Multiply by r

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

$x = r\cos\theta$

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

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

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

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

$(x^2 + y^2 - 2x)^2 = 4r^2$

$\boxed{(x^2 + y^2 - 2x)^2 = 4(x^2 + y^2)}$

Nov 26-10:56 AM

Convert $r = \dfrac{12}{3\sin\theta - 4\cos\theta}$ to rectangular.

Hint: Cross-multiply

$$3\underbrace{r\sin\theta}_{y} - 4\underbrace{r\cos\theta}_{x} = 12$$

$$\boxed{3y - 4x = 12}$$

Convert $r^2 = \tan\theta$ to rectangular.

$x^2 + y^2 = \dfrac{y}{x}$ $\qquad x^3 + xy^2 = y$

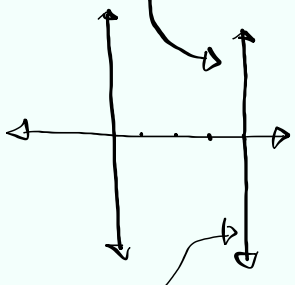
Nov 26-11:01 AM

Graph $r = \dfrac{4}{\cos\theta}$

Cross-Multiply

$r\cos\theta = 4$

$x = 4$

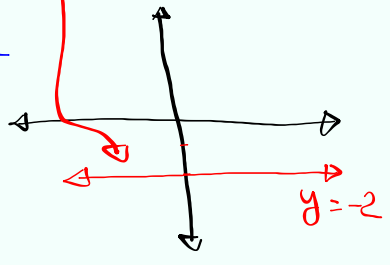


Graph $r = -2\csc\theta$

$r = -2 \cdot \dfrac{1}{\sin\theta}$

$r\sin\theta = -2$

$y = -2$



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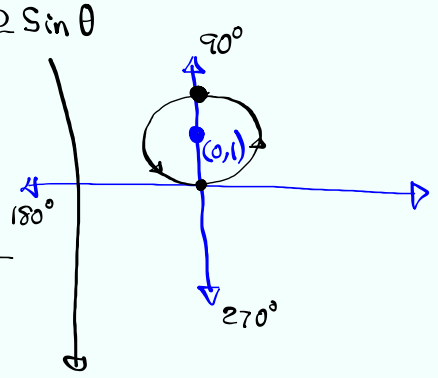
Graph $r = 2\sin\theta$

θ	r
0°	0
90°	2
180°	0
270°	-2
360°	0



$r = 2\sin\theta$

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

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

$x^2 + y^2 - 2y + 1 = 0 + 1$

$(x-0)^2 + (y-1)^2 = 1$

Circle center $(0,1)$

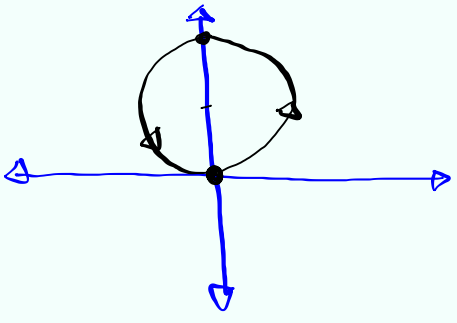
Radius 1

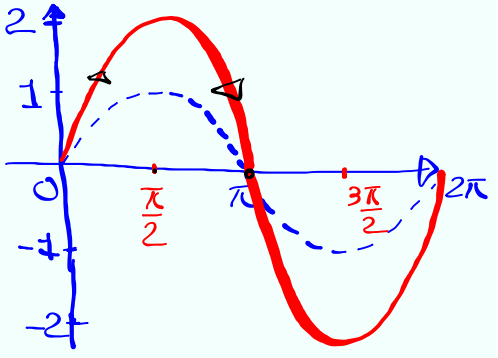
Nov 26-11:11 AM

Graph $r = 2\sin\theta$

Hold!

Graph $y = 2\sin x$





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Graph $r = 1 - 2\sin\theta$

θ	r
✓ $0°$	1
✓ $90°$	-1
$180°$	1
$270°$	3
$360°$	1

$r = 0$ QI

$r = 0$ QII

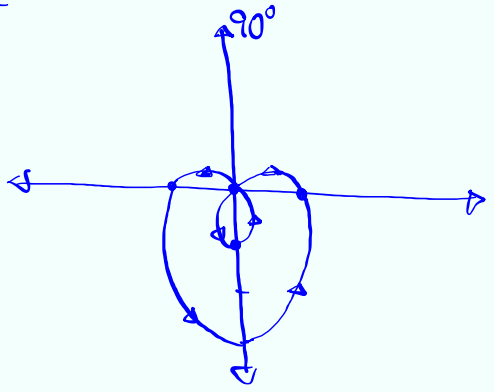
$1 - 2\sin\theta = 0$

$\sin\theta = \frac{1}{2}$

RA $= 30°$

$\theta = 30°$ ✓

$\theta = 150°$ ✓



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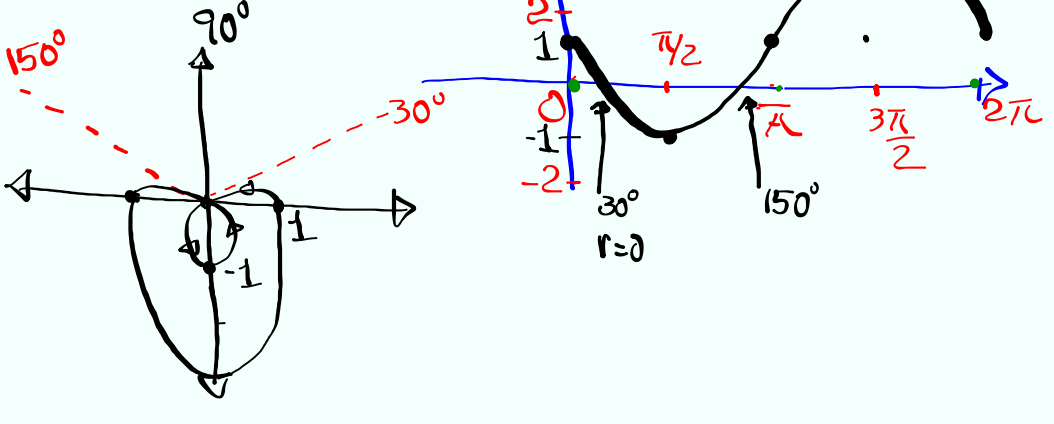
Graph $r = 1 - 2\sin\theta$ by tracing.

Hold

Graph $y = 1 - 2\sin x$



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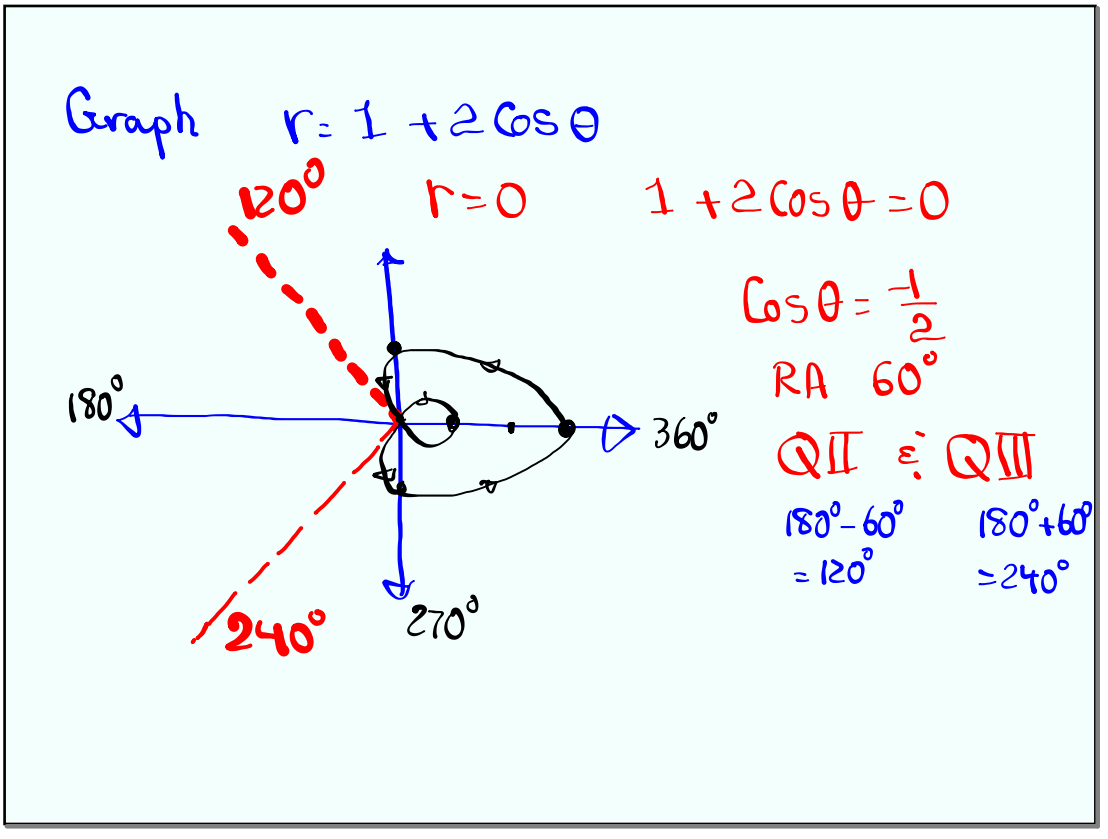

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