

Converting Polar to Rectangular and Vice Versa

Equations

Polar to rectangular

a) $r = 2$

Ex 1

Circle with radius of 2 centered at origin (0,0)

- Recall equation of circle

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

(center (h,k))

radius r

$$\text{so } r^2 = 4$$

$$h=0 \quad k=0$$

$$\text{so } (x-0)^2 + (y-0)^2 = 2^2 \quad \text{or } \boxed{x^2 + y^2 = 4}$$

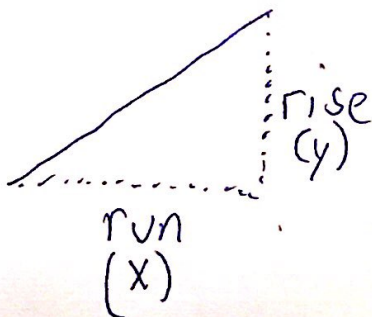
Ex 2

b.) $\theta = \pi/3$

all points on the line that make an angle of $\pi/3$

$m = \text{slope}$

$b = \text{y-intercept}$

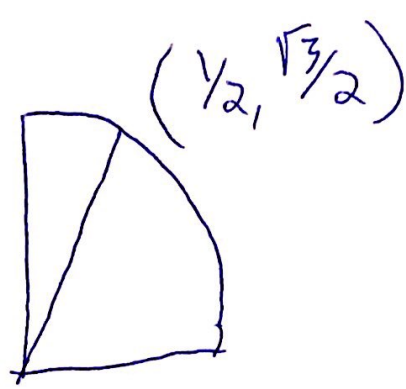


Equation of a line $y = mx + b$

$b = 0$ because line crosses y-axis at 0
slope of line / hypotenuse

slope is $\frac{y}{x}$ or $\tan \theta$

so $\tan \theta$ at $\frac{\pi}{3}$



$$\tan\left(\frac{\pi}{3}\right) = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$$

so slope (m) = $\sqrt{3}$

Equation is $y = \sqrt{3}x$

c.) Ex 3

Recall $x = r \cos \theta$

$$r = \sec \theta$$

$$r = \frac{1}{\cos \theta} \quad \text{so} \quad r \cos \theta = 1 \rightarrow \text{so } x = 1 \text{ is equation}$$

