

Convert the given Polar coordinates (r, θ)
to rectangular coordinates (x, y) .

$$\begin{array}{c} r \quad \theta \\ \downarrow \quad \downarrow \\ (-5, 315^\circ) \end{array}$$

$$\begin{array}{l} x = r \cos \theta \\ y = r \sin \theta \end{array}$$

$$x = (-5) \cos(315^\circ)$$

$$\downarrow$$

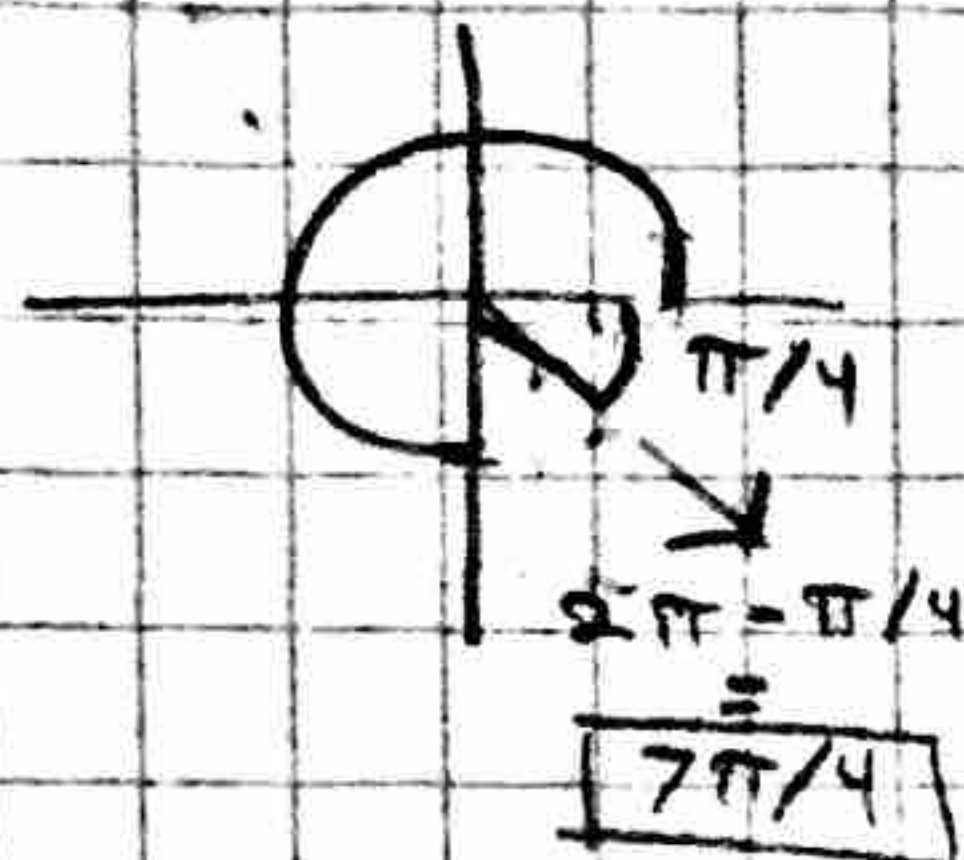
$$x = (-5) \cos\left(\frac{7\pi}{4}\right)$$

$$\downarrow$$

$$(-5) \left(\frac{\sqrt{2}}{2} \right)$$

$$\downarrow$$

$$\boxed{x = -\frac{5\sqrt{2}}{2}}$$



$$y = (-5) \sin(315^\circ)$$

$$\downarrow$$

$$y = (-5) \sin\left(\frac{7\pi}{4}\right)$$

$$\downarrow$$

$$(-5) \left(-\frac{\sqrt{2}}{2} \right)$$

$$\downarrow$$

$$\boxed{y = \frac{5\sqrt{2}}{2}}$$

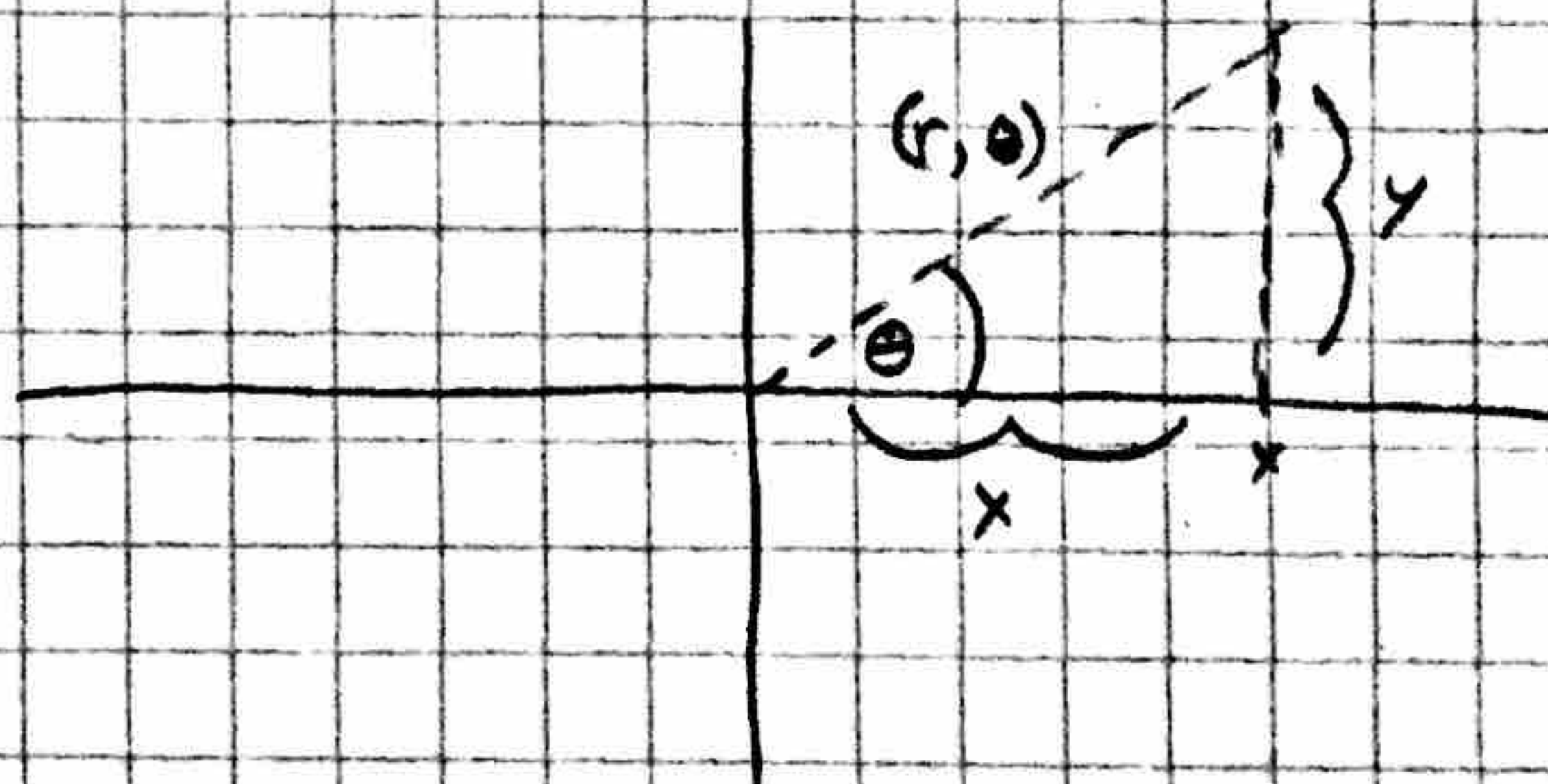
Properties

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

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

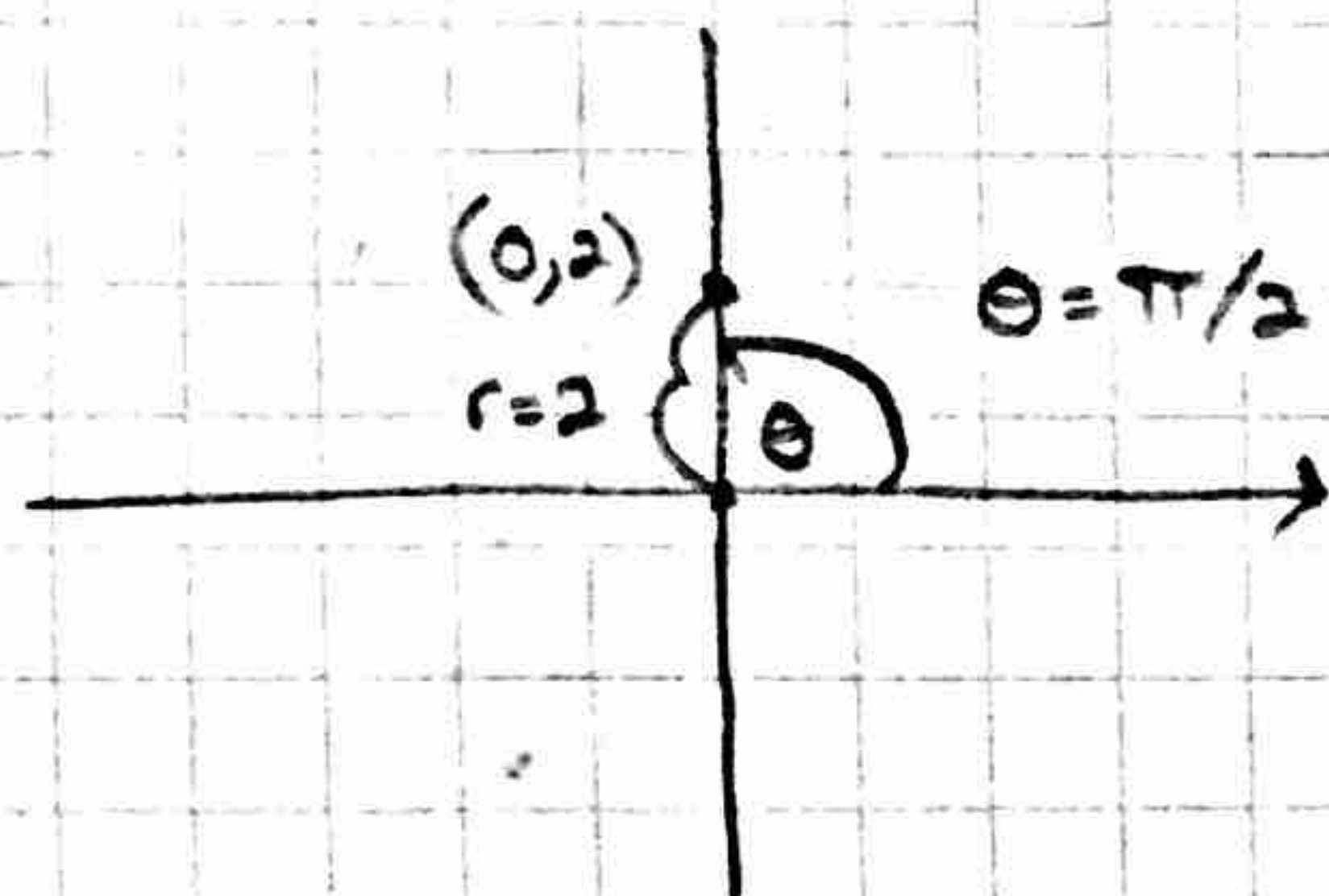
$$\cos \theta = \frac{x}{r} \rightarrow x = r \cos \theta$$

$$\sin \theta = \frac{y}{r} \rightarrow y = r \sin \theta$$



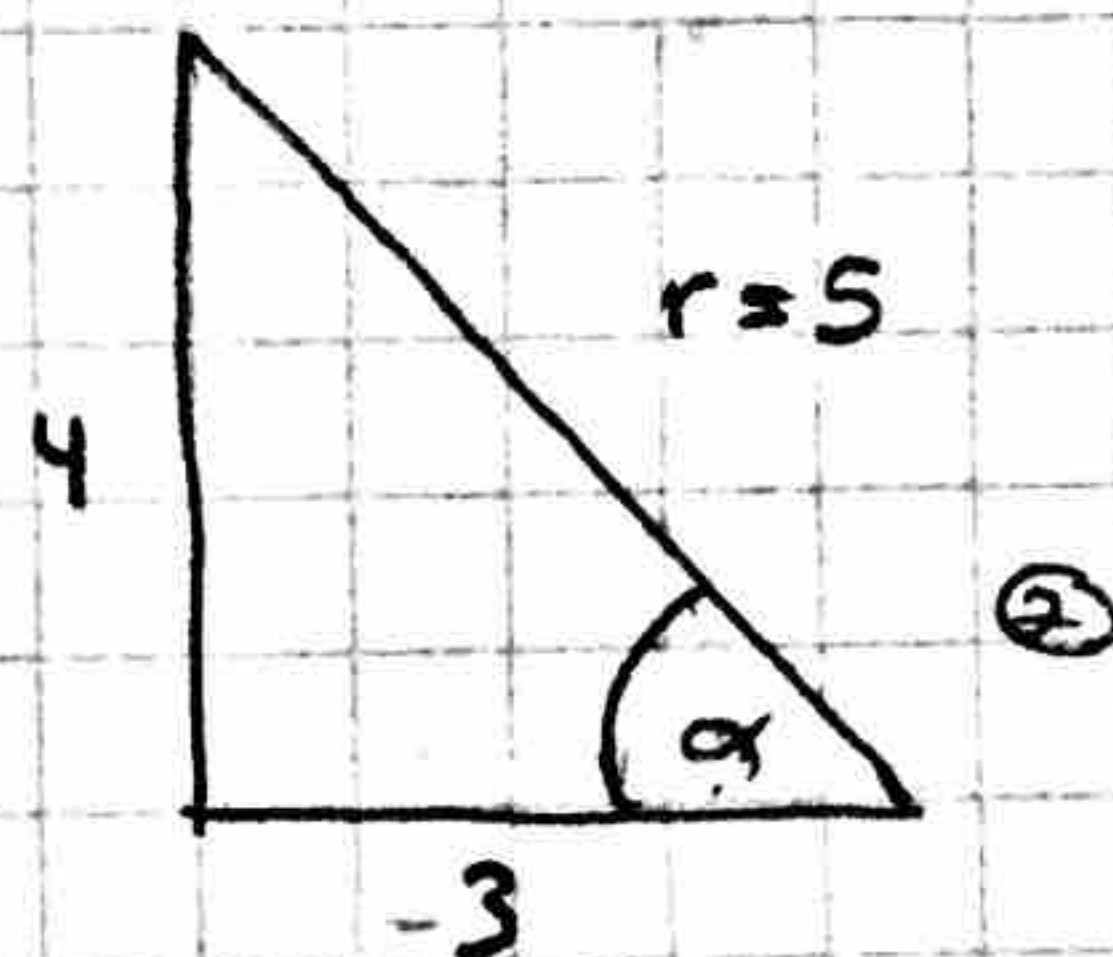
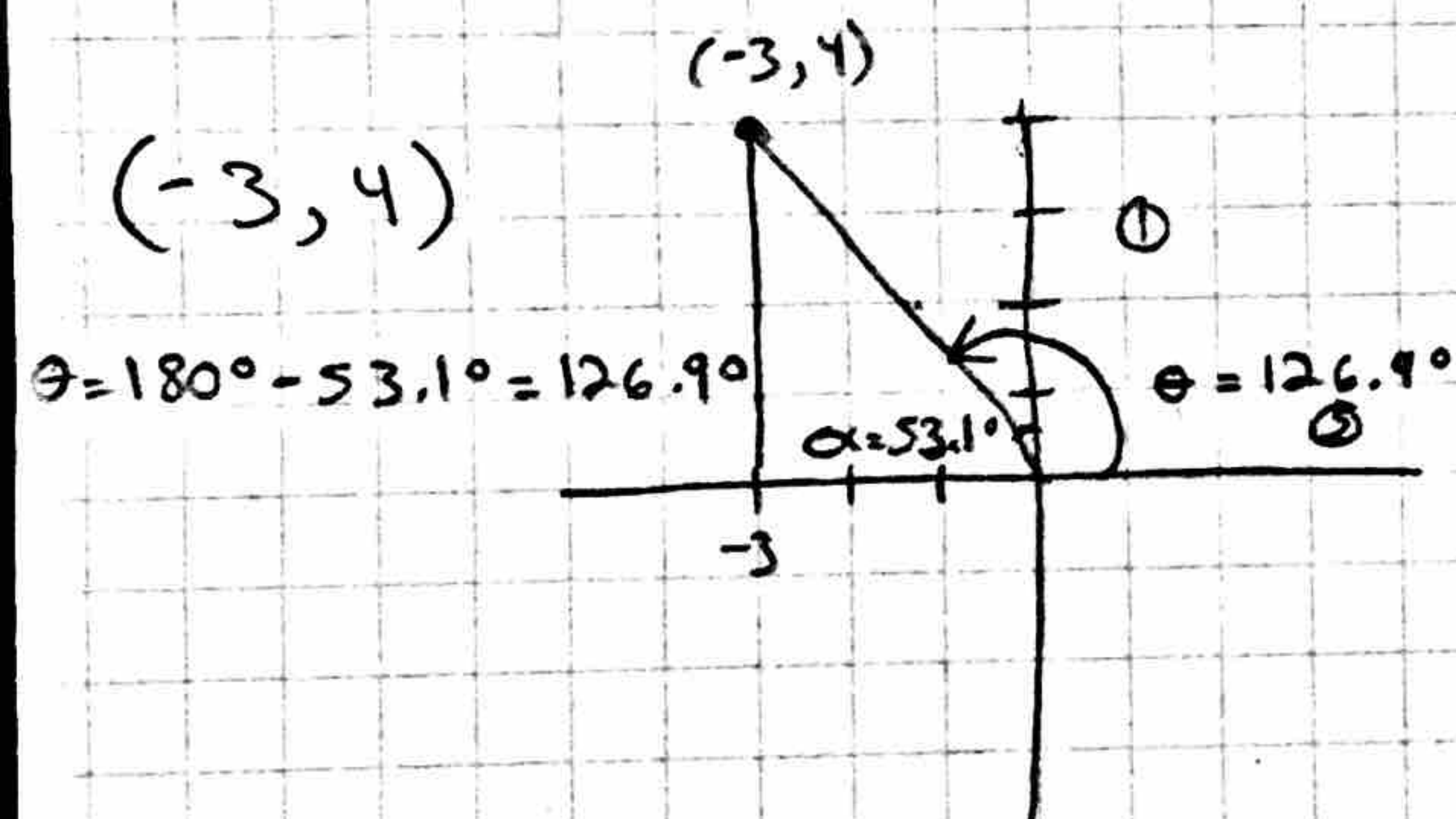
Convert given rectangular coordinates to polar coordinates

$(0, 2)$



$$P: (2, \pi/2)$$

$(-3, 4)$



$$\begin{aligned} r^2 &= 3^2 + 4^2 \\ r^2 &= 9 + 16 \\ \sqrt{r^2} &= \sqrt{25} \rightarrow r = \pm 5 \end{aligned}$$

radius needs to be positive
so take the positive 5

$$r = 5$$

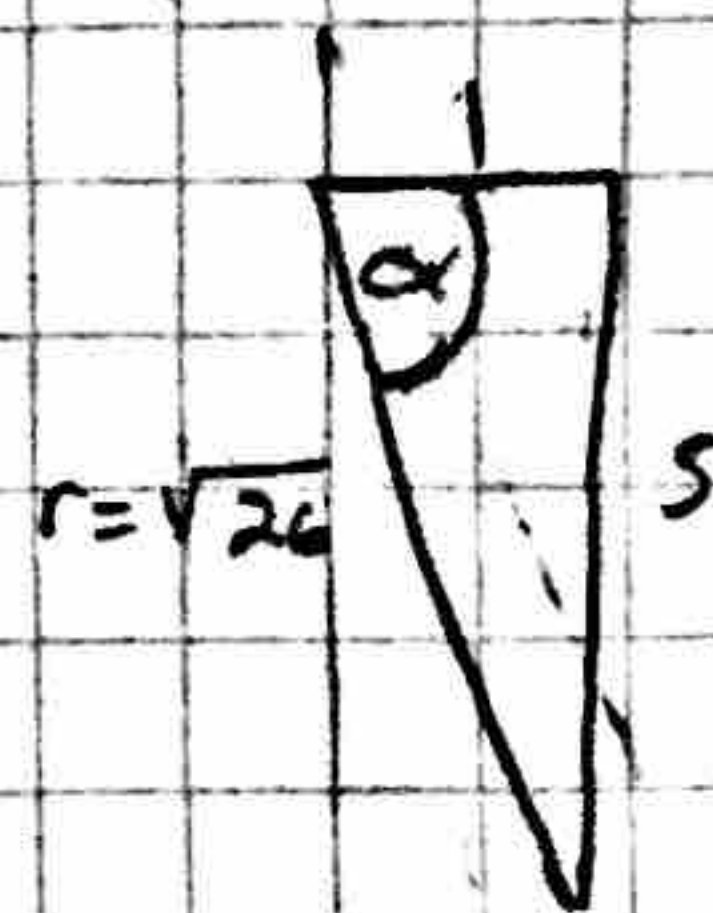
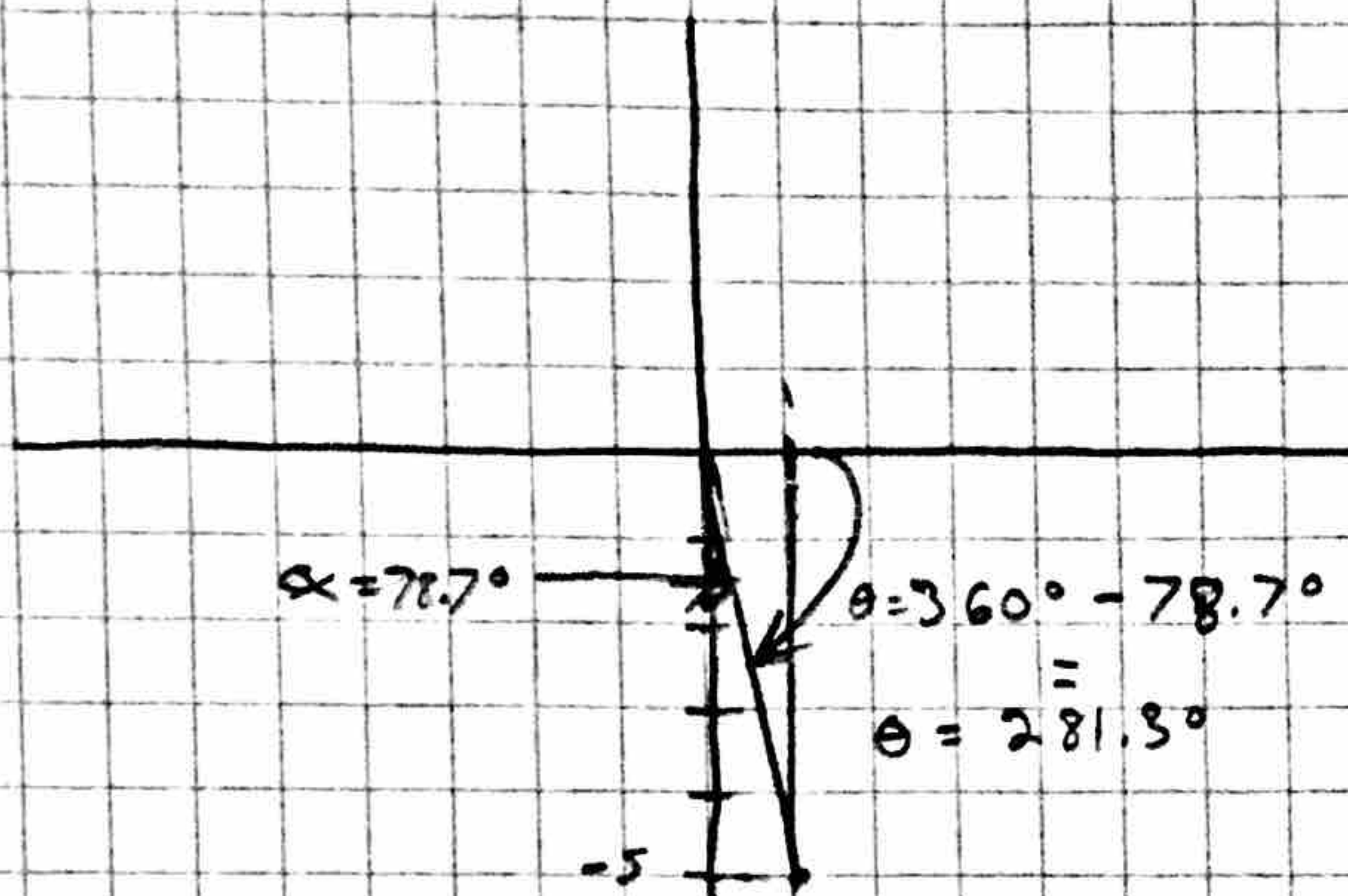
$$\tan \alpha = \frac{4}{3}$$

$$\tan^{-1}(\tan \alpha) = \tan^{-1}\left(\frac{4}{3}\right) \approx 53.1301^\circ$$

$$\alpha = 53.1^\circ$$

Polar Form
 $(5, 126.9^\circ)$

$(1, -5)$



$$\begin{aligned} r^2 &= 5^2 + 1^2 \\ r^2 &= 25 + 1 \\ \sqrt{r^2} &= \pm\sqrt{26} \rightarrow \boxed{r = \sqrt{26}} \end{aligned}$$

Polar Form

$P: (\sqrt{26}, 281.3^\circ)$

$$\begin{aligned} \tan \alpha &= \frac{5}{1} \\ \downarrow \\ \tan^{-1}(\tan \alpha) &= \tan^{-1}(5) \end{aligned}$$

$$\begin{aligned} \alpha &= 78.6901^\circ \\ \boxed{\alpha &= 78.7^\circ} \end{aligned}$$