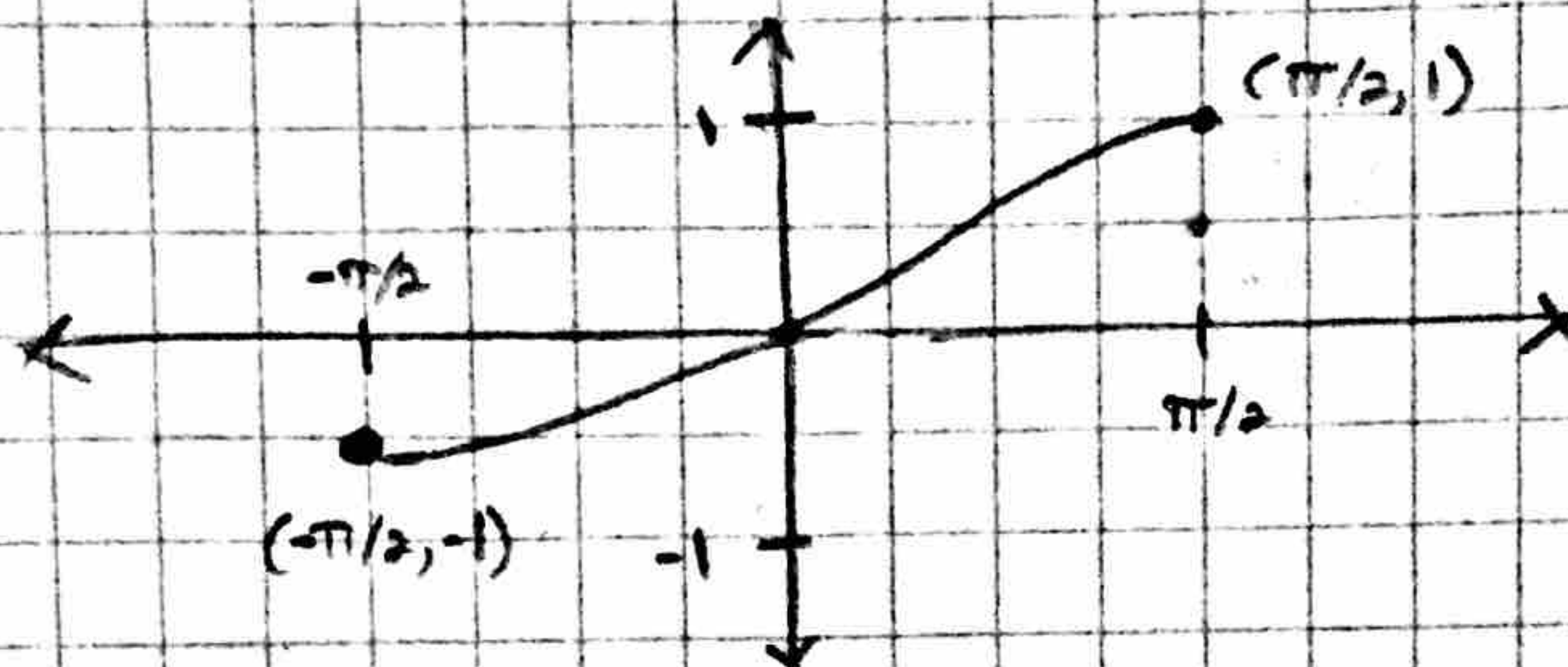
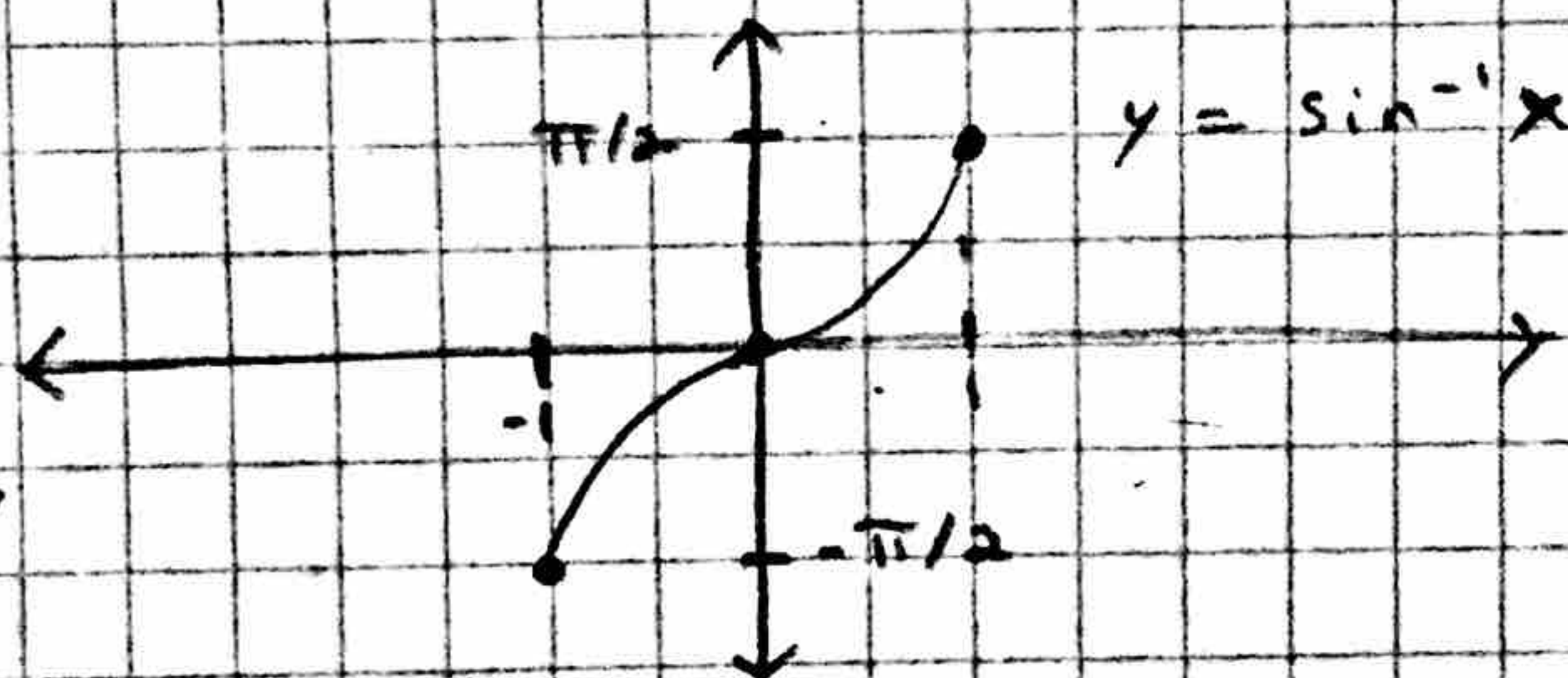


Sine Graph



Inverse Graph

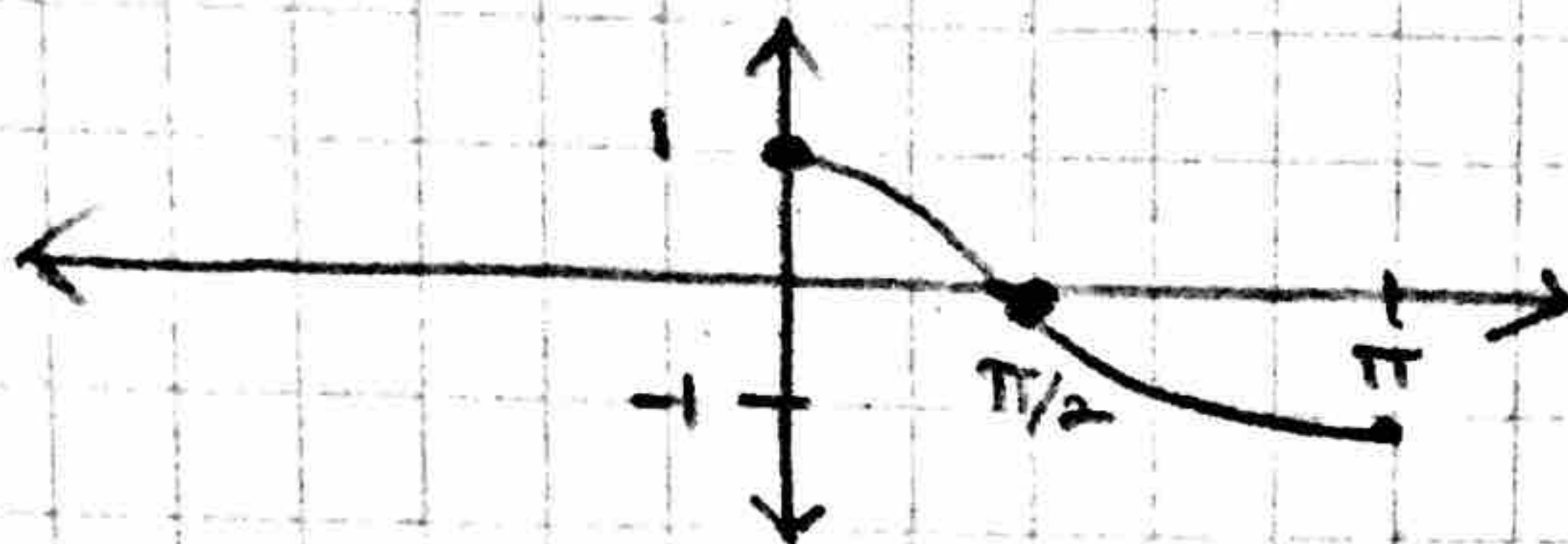


$$\sin^{-1} x = y \iff \sin y = x \quad (-\pi/2 \leq y \leq \pi/2)$$

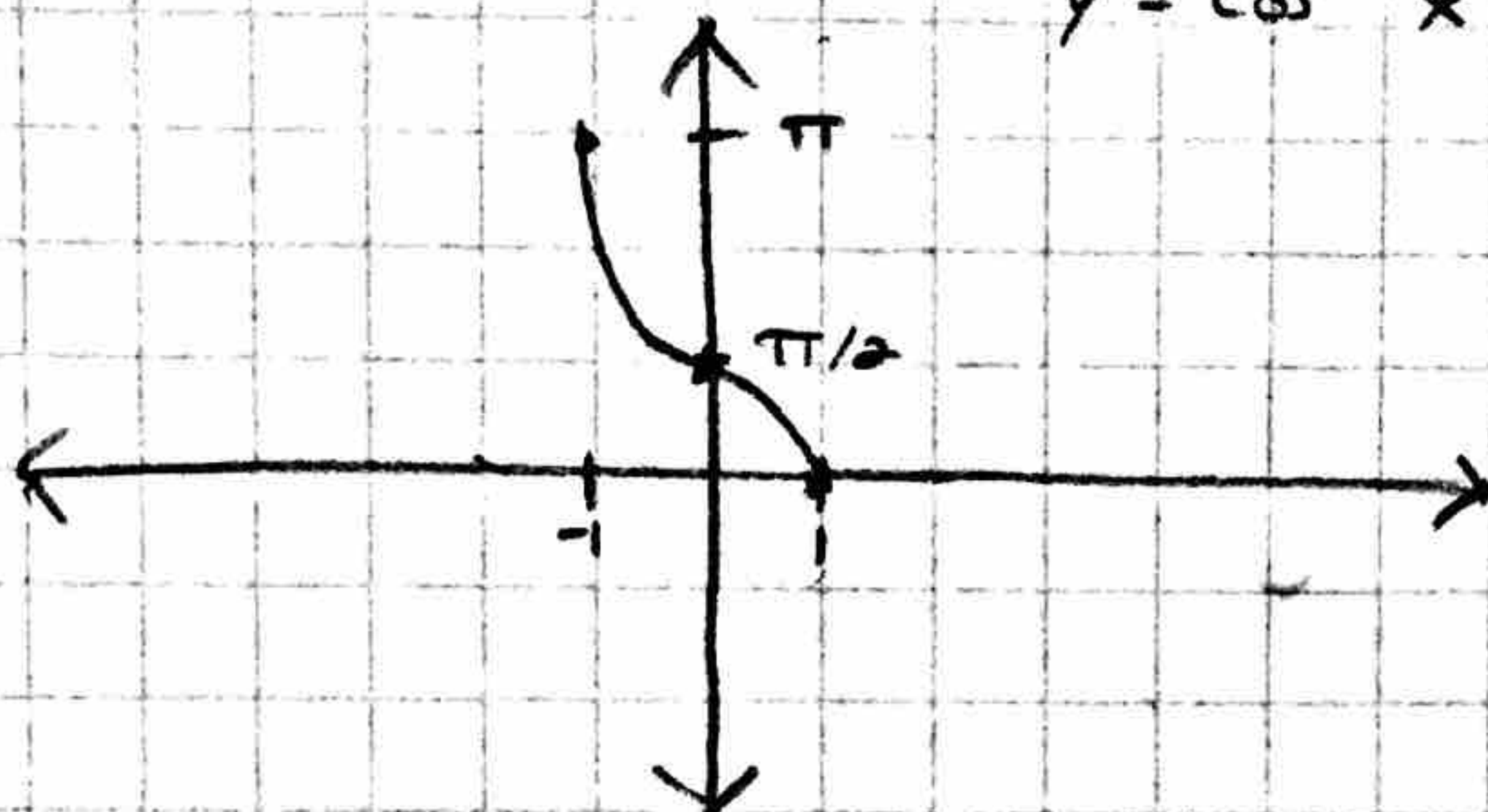
$$\sin^{-1}(\sin x) = x \quad ; \quad -\pi/2 \leq x \leq \pi/2$$

$$\sin(\sin^{-1} x) = x \quad ; \quad -1 \leq x \leq 1$$

$$y = \cos x$$



$$y = \cos^{-1} x$$

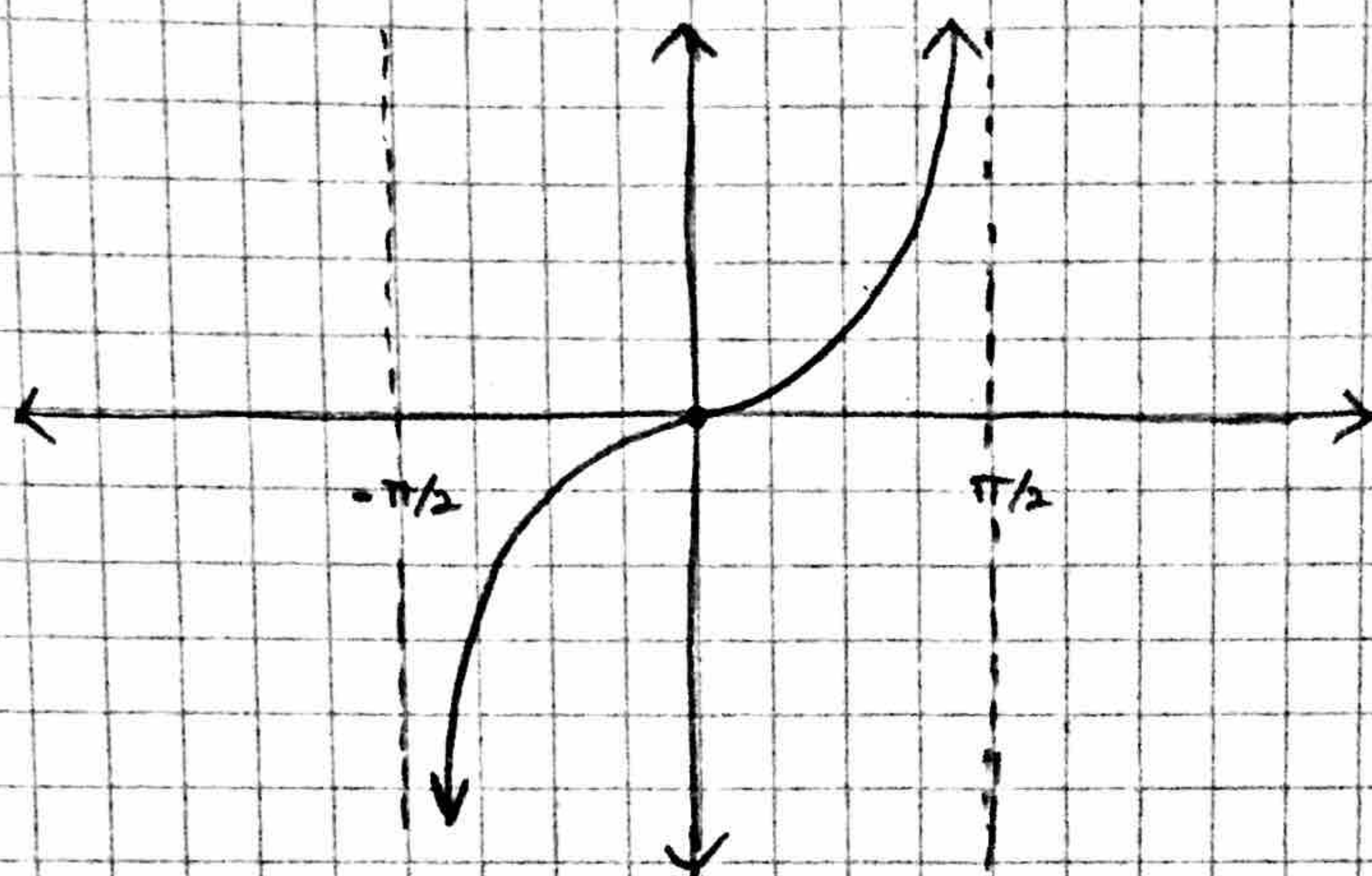


$$\cos^{-1} x = y \iff \cos y = x$$

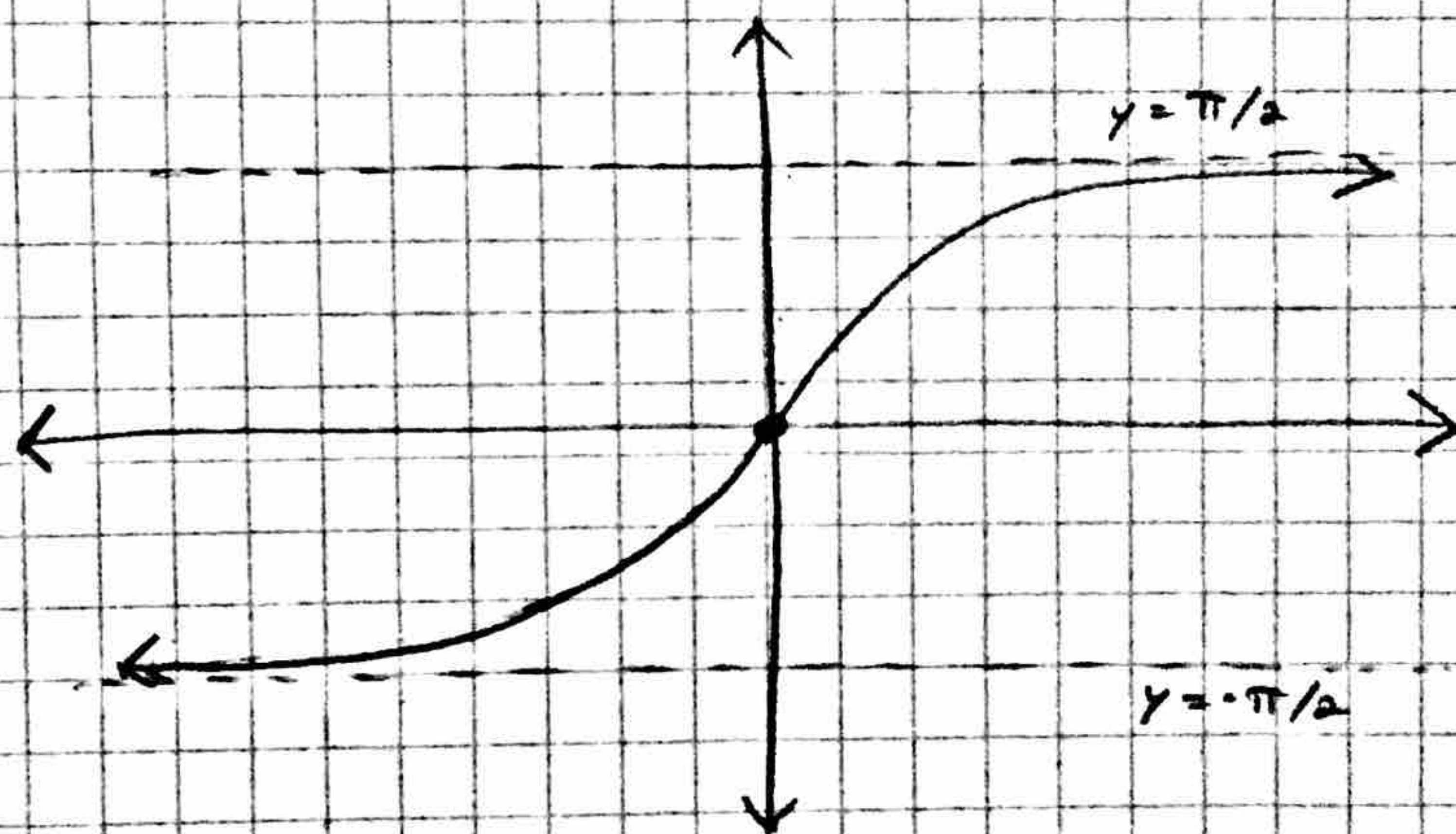
$$0 \leq y \leq \pi \quad (\text{so that cosine is 1-1})$$

$$\begin{aligned} \cos^{-1}(\cos x) &= x, & 0 \leq x \leq \pi \\ \cos(\cos^{-1} x) &= x, & -1 \leq x \leq 1 \end{aligned}$$

$$y = \tan x$$



$$y = \tan^{-1} x$$



$$\tan^{-1} x = y \iff \tan(y) = x, \quad -\pi/2 < y < \pi/2$$

$\lim_{x \rightarrow \infty} \tan^{-1} x = \pi/2$ \rightarrow as x approaches infinity, arc tan approaches $\pi/2$
 Describing horizontal asymptotes

$\lim_{x \rightarrow -\infty} \tan^{-1} x = -\pi/2$ \rightarrow as x approaches negative infinity, the y value of arc tan approaches $-\pi/2$

$$\tan\left(\sin^{-1}\left(\frac{2}{3}\right)\right)$$

$$\theta = \sin^{-1}\left(\frac{2}{3}\right)$$

Tan Domain Test

$$\pi/2 \leq \theta \leq \pi/2$$

or

$$0 \leq \theta \leq \pi/2$$

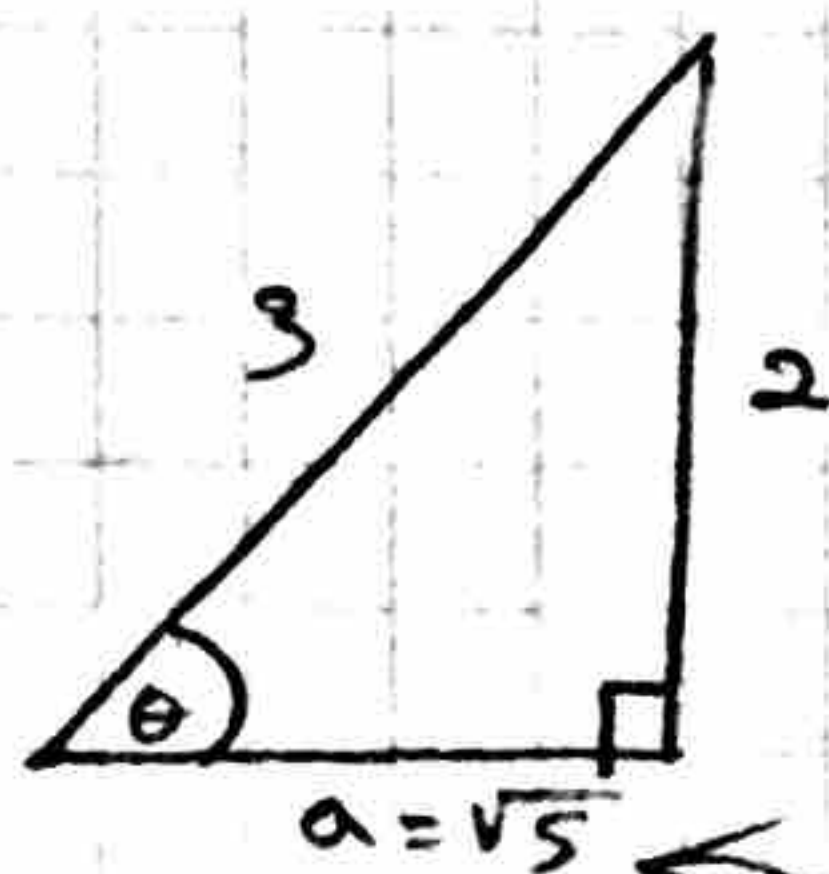
Since sine
is positive

$$\sin \theta = \sin\left(\sin^{-1}\left(\frac{2}{3}\right)\right)$$

Sine Domain Test for
Exact Value

$$-1 \leq \frac{2}{3} \leq 1$$

$$\boxed{\sin \theta = \frac{2}{3}} \quad \frac{0}{\pi}$$



$$\rightarrow a^2 + 2^2 = 3^2$$

↓

$$a^2 + 4 = 9$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\sqrt{a^2} = \sqrt{5}$$

$$\boxed{a = \sqrt{5}}$$

↓

$$\tan \theta = \frac{O}{A} = \frac{2}{\sqrt{5}}$$

↓

$$\tan \theta = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

↓

$$\frac{2\sqrt{5}}{\sqrt{25}}$$

↓

$$\tan \theta = \frac{2\sqrt{5}}{5}$$