Function	Meaning
Inverse Sine Function	$y = \sin^{-1} x$ means that $\sin y = x$ and y is in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
Inverse Cosine Function	$y = \cos^{-1} x$ means that $\cos y = x$ and y is in $[0, \pi]$
Inverse Tangent Function	$y = \tan^{-1} x$ means that $\tan y = x$ and y is in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Find the exact value of $\tan^{-1}\left(\tan\frac{5\pi}{6}\right)$.

$$\text{Tan}\left(\frac{5\pi}{6}\right) = -\sqrt{3}/3$$

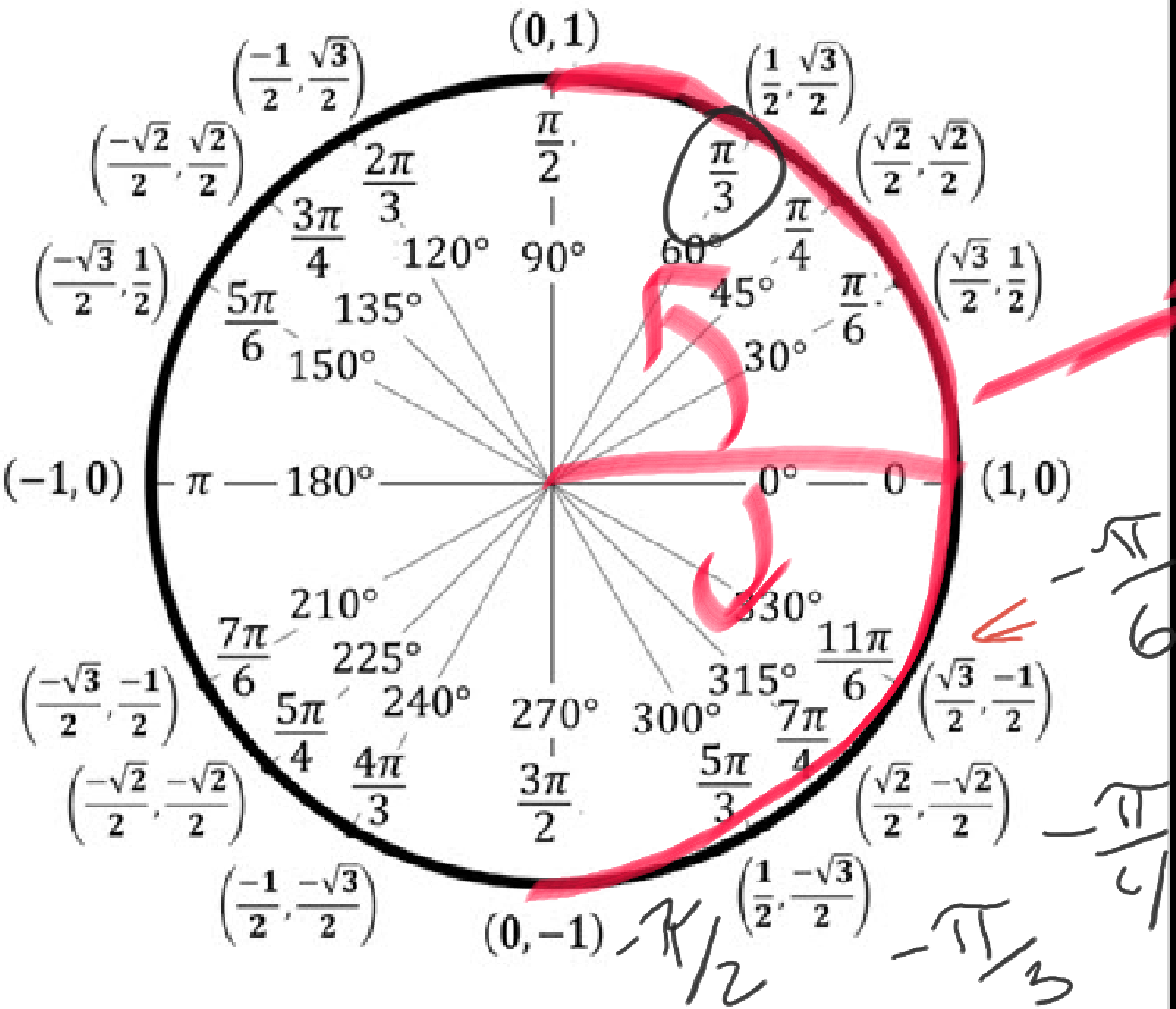
$$\text{Tan}^{-1}\left(-\frac{\sqrt{3}}{3}\right) = -\frac{\pi}{6}$$

$$\frac{\sqrt{3}}{3}$$

$$-1$$

$$\sqrt{3}$$

Unit Circle



$\text{Tan} = \frac{y}{x}$ $\quad \frac{1/2}{-\frac{\sqrt{3}}{2}}$

Sin
Tan

$-\frac{1}{\sqrt{3}}$

$\cdot \frac{\sqrt{3}}{3}$

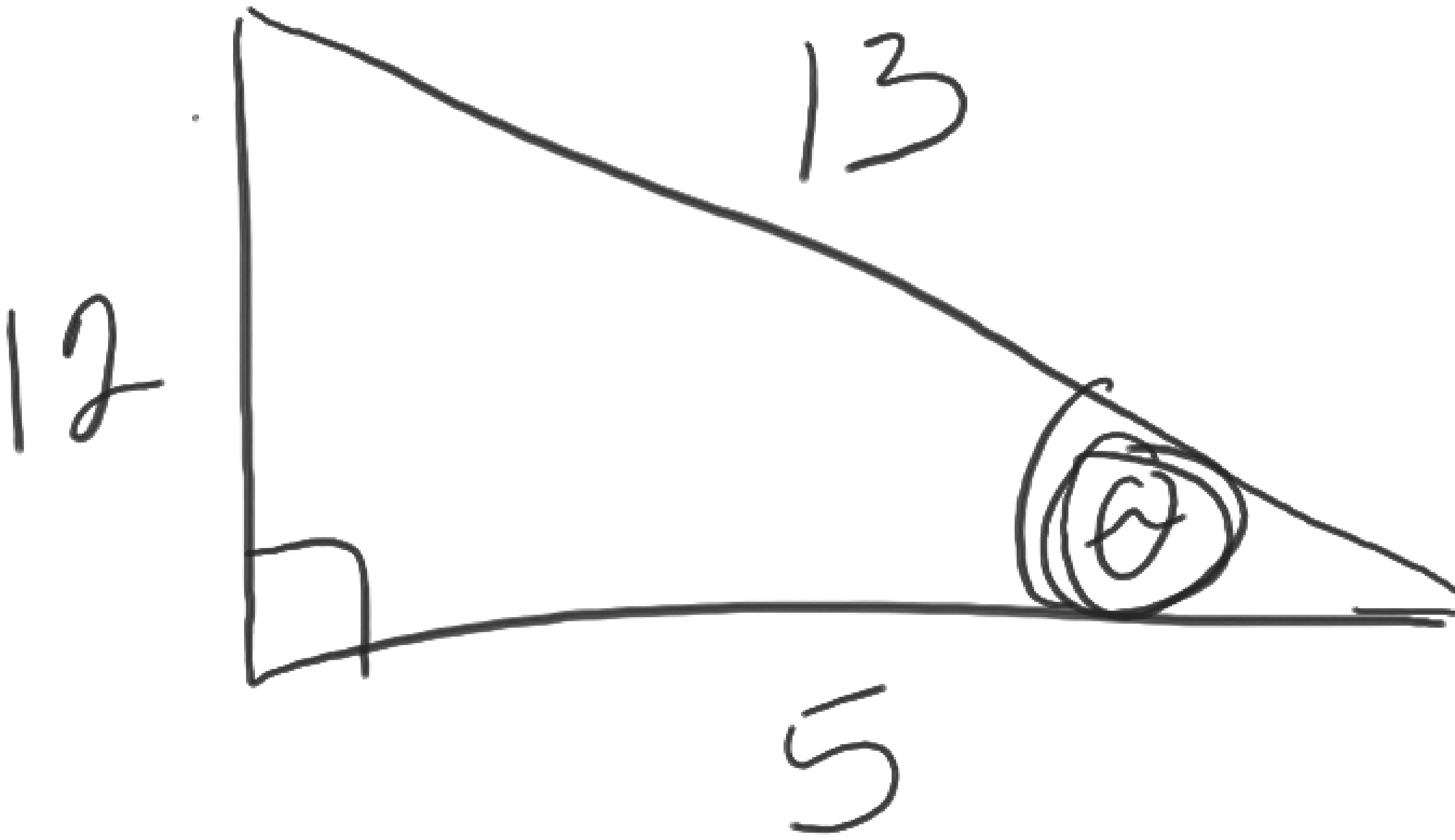
$\sin^{-1}\left(\sin\frac{2\pi}{3}\right).$

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

Find the exact value of $\cos\left(\sin^{-1}\left(\frac{12}{13}\right)\right)$ $\rightarrow$ $\underline{\cos\theta} = \frac{5}{13}$

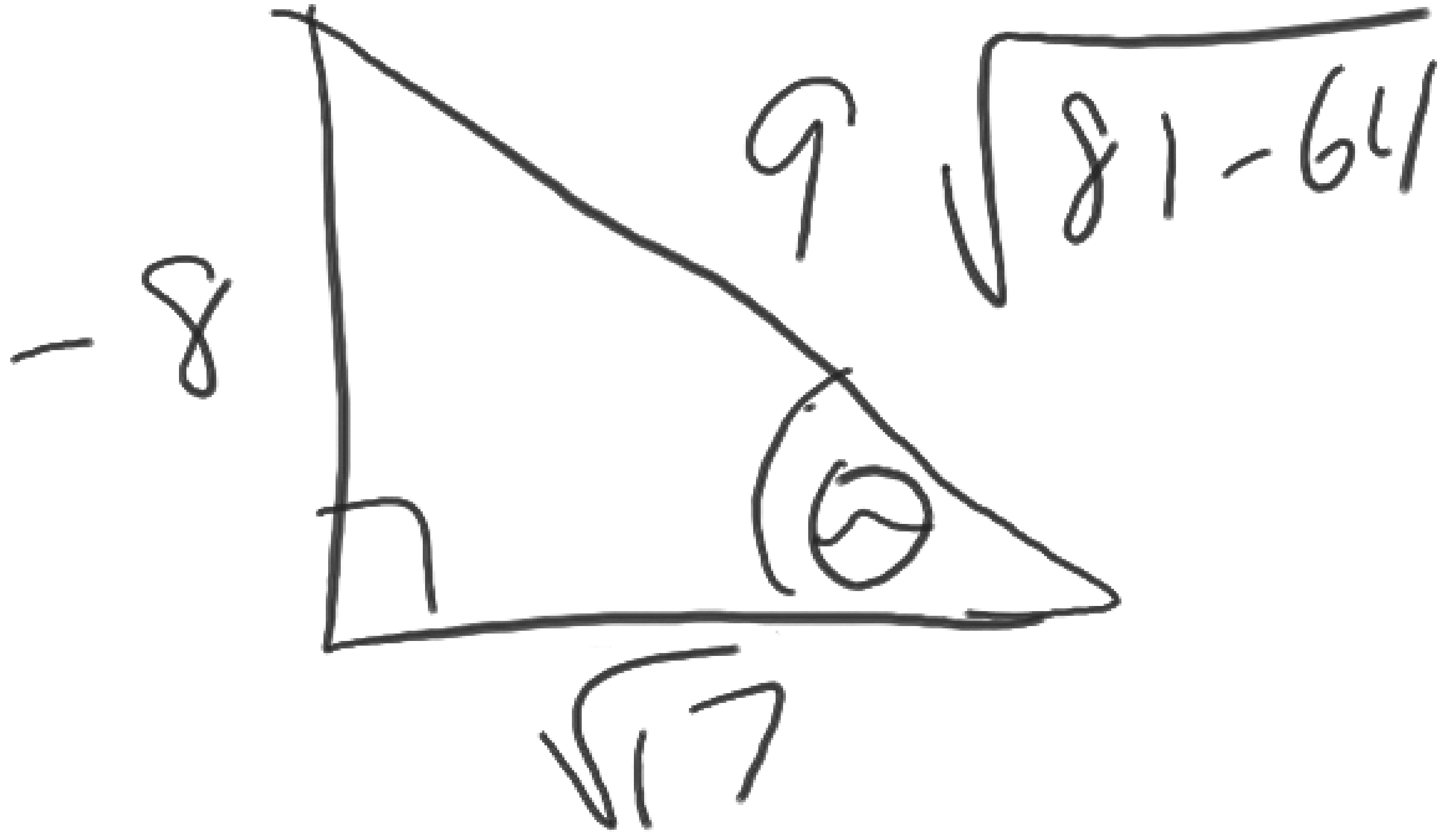
$$\sin^{-1}\left(\frac{12}{13}\right) = \theta$$

$$\frac{12}{13} = \sin\theta$$



Find the exact value of $\cot\left(\sin^{-1}\left(-\frac{8}{9}\right)\right)$

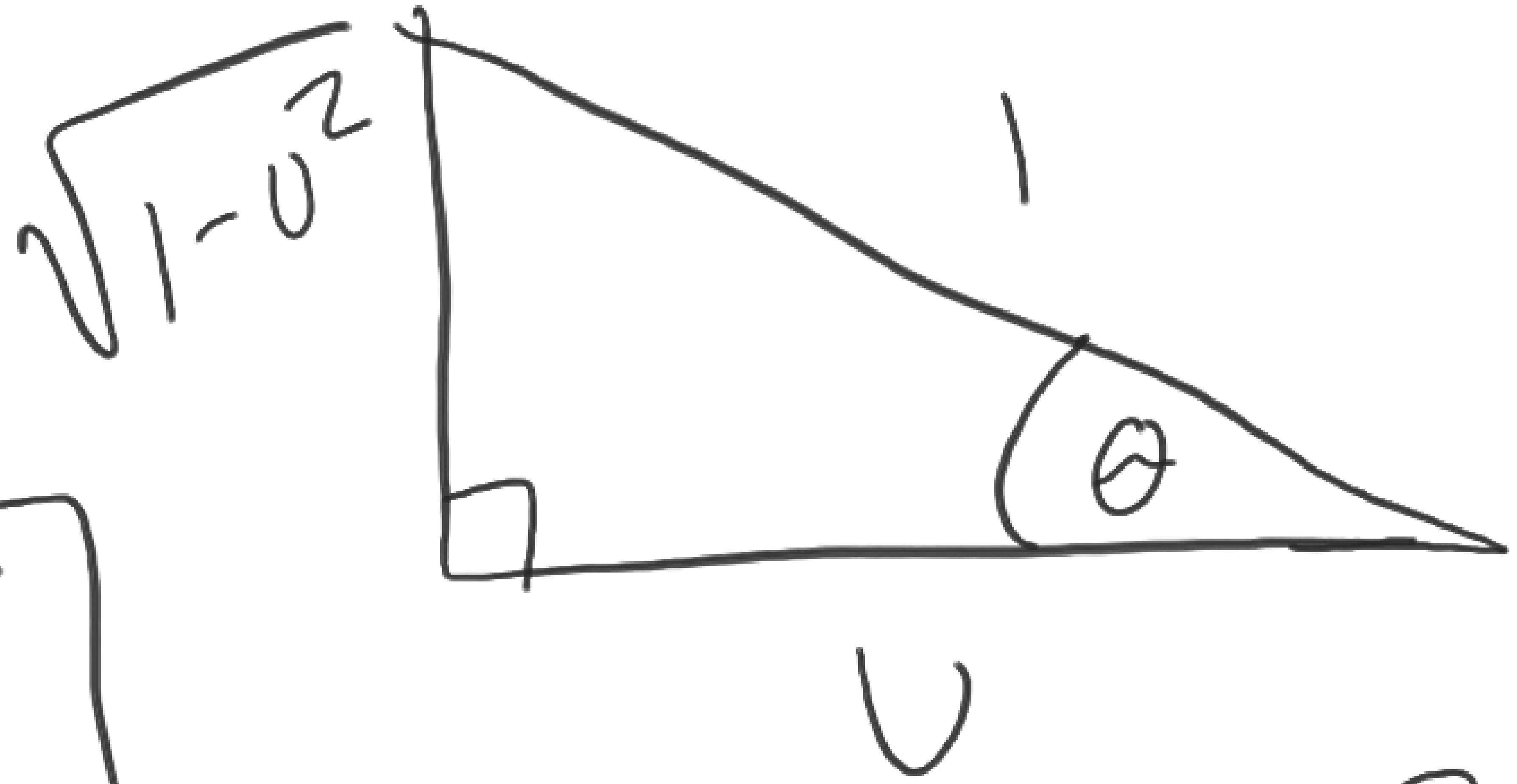
$$= -\frac{\sqrt{17}}{8}$$



Find the exact value of $\cos\left(\arcsin\left(\frac{1}{2}\right)\right)$.

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

$\sin\left(\cos^{-1} u\right)$



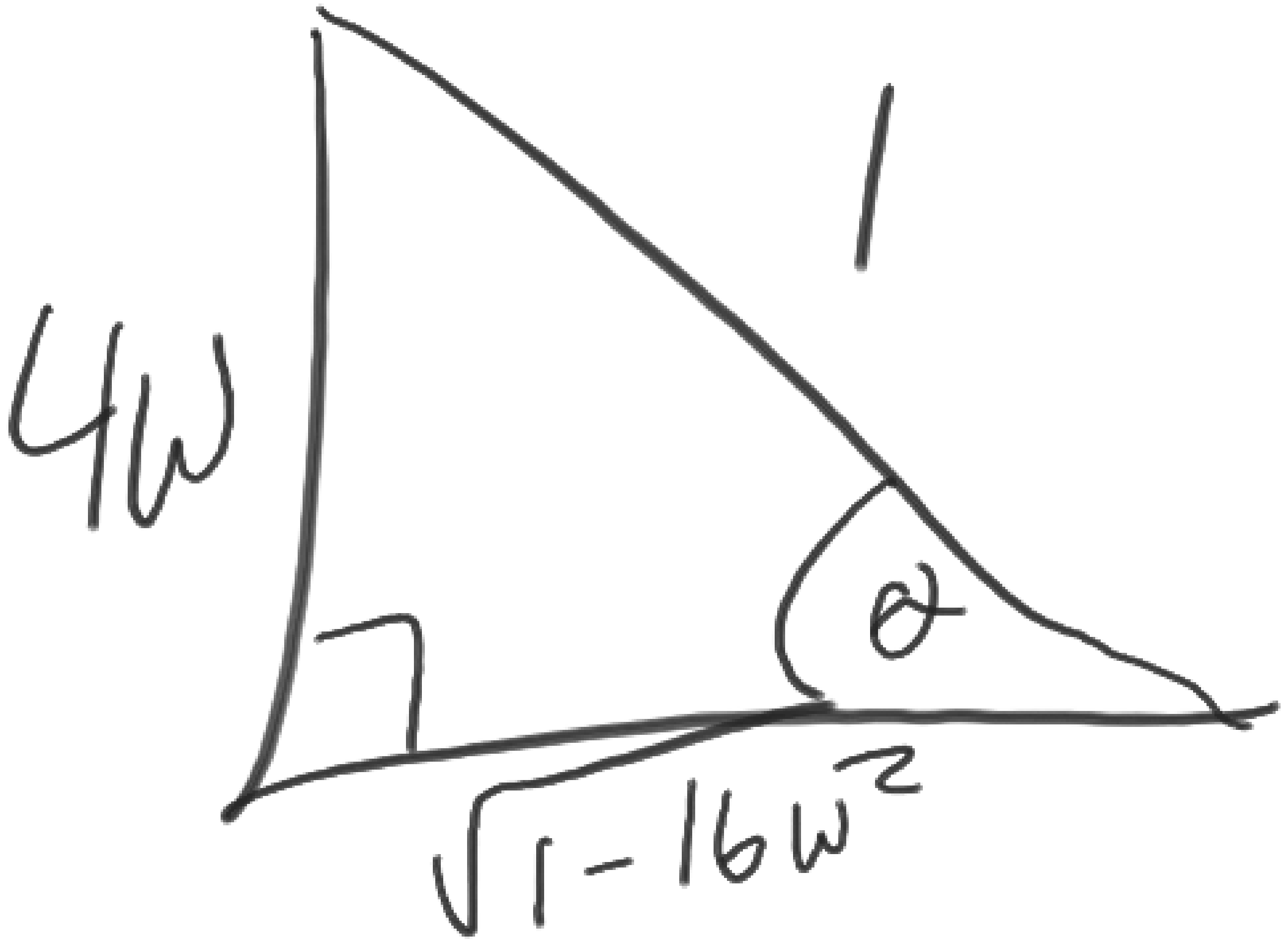
$$\frac{\sqrt{1-u^2}}{1} = \boxed{\sqrt{1-u^2}}$$

$$x^2 + u^2 = 1^2$$

$$x^2 = 1 - u^2$$

$$x = \sqrt{1-u^2}$$

$$\cot\left(\sin^{-1} 4w\right) = \frac{\sqrt{1-16w^2}}{4w}$$

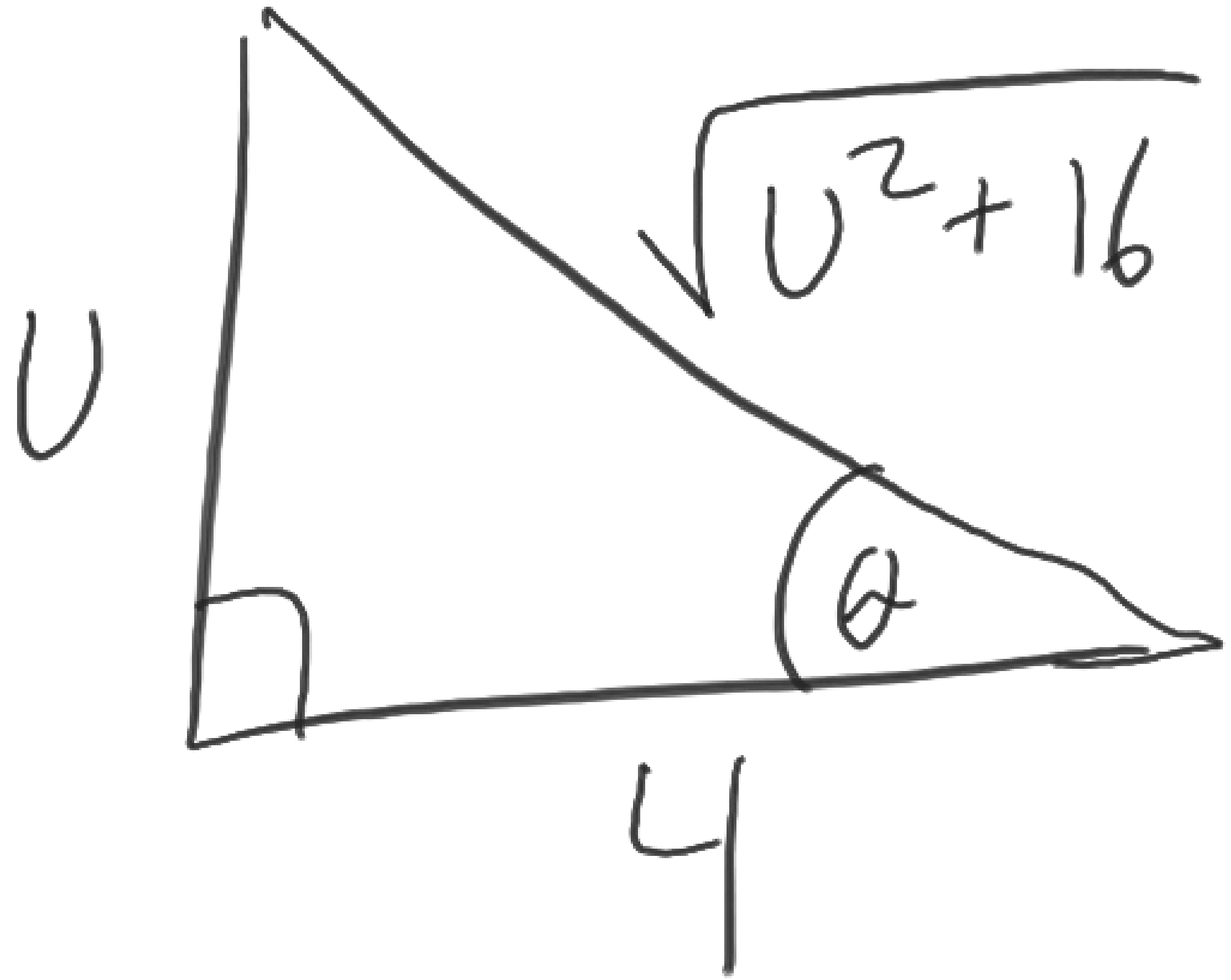


$$x^2 + (4w)^2 = 1^2$$

$$\sqrt{x^2} = \sqrt{1-16w^2}$$

$$\sec\left(\tan^{-1}\frac{u}{4}\right)$$

$$\sec = \frac{H}{A} = \boxed{\frac{\sqrt{u^2+16}}{4}}$$



$$2\sin\theta - \sqrt{3} = 0$$

$$2x - \sqrt{3} = 0$$

$$2\sin\theta = \sqrt{3}$$

$$2x = \sqrt{3}$$

$$\sin\theta = \frac{\sqrt{3}}{2}$$

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

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

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

$$\sin\theta = \frac{\sqrt{3}}{2} \qquad \theta = \frac{\pi}{3} + 2k\pi$$

$$\frac{2\pi}{3} + 2k\pi$$

Find all solutions to the equation.

$$\csc\theta + 2 = 0$$

Write your answer in radians in terms of π, and use the "**or**" button as necessary.

Example: $\theta = \frac{\pi}{5} + 2k\pi,\ k \in \mathbb{Z}$ or $\theta = \frac{\pi}{7} + k\pi,\ k \in \mathbb{Z}$

Help with this notation

$\csc\theta = -2$

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

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

$\theta = \frac{7\pi}{6} + 2k\pi$

$\frac{11\pi}{6} + 2k\pi$

$$\sqrt{3}\tan\theta - 1 = 0$$

$$\tan\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\text{or } \frac{1/2}{\sqrt{3}/2}$$

$$\theta = \frac{\pi}{6} + k\pi$$

$$\cancel{\frac{7\pi}{6}}$$

Find all solutions of the equation in the interval $[0, 2\pi)$.

$$2\sin^2 x - 1 = 0$$

$$\sqrt{\sin^2 x} = \sqrt{\frac{1}{2}}$$

$$\sin x = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$x = \frac{\pi}{4}, \frac{3\pi}{4}$$

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

$$y^2 = \frac{1}{2}$$

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

Find all solutions of the equation in the interval $[0, 2\pi)$.

$$2\sin^2 x + 3\sin x - 2 = 0$$

$$2y^2 + 3y - 2 = 0$$

$b^2 - 4ac$

$\frac{-3 \pm 5}{4}$ $\nearrow$ $1/2$, $\searrow$ -2

$y = 1/2 \quad y = -2$

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

~~$\sin x = -2$~~

$x = \frac{\pi}{6}, \frac{5\pi}{6}$

Find all solutions of the equation in the interval $[0, 2\pi)$.

$$\csc^2 x + 3 \csc x + 2 = 0$$

$y^2 + 3y + 2 = 0$

$(y+2)(y+1)$

$y = -2, -1$

$\csc x = -2$

$\sin x = -\frac{1}{2}$

$\csc x = -1$

$\sin x = -1$

$$\boxed{x = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}}$$

$$y^4 + 3y^2 - 5 = 0 \qquad x = y^2$$

$$x^2 + 3x - 5 =$$

Find all solutions to the equation.

$$\cos^2 x - 4\cos x = -3 \longrightarrow$$

$$y^2 - 4y + 3 = 0$$

$$(y-3)(y-1) = 0$$

Write your answer in radians in terms of π, and use the "**or**" button as necessary.

Example: $x = \frac{\pi}{5} + 2k\pi,\ k \in \mathbb{Z}$ or $x = \frac{\pi}{7} + k\pi,\ k \in \mathbb{Z}$

Help with this notation

$\cos x = 3 \rightarrow$ und

$\cos x = 1 \rightarrow \quad x = 0 + 2k\pi = 2k\pi$