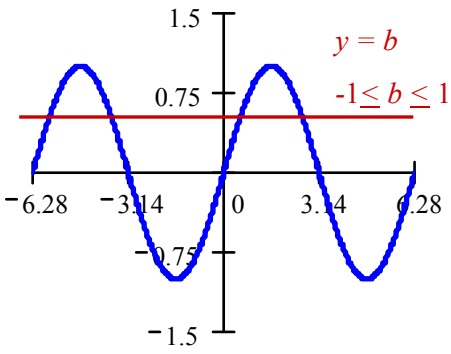
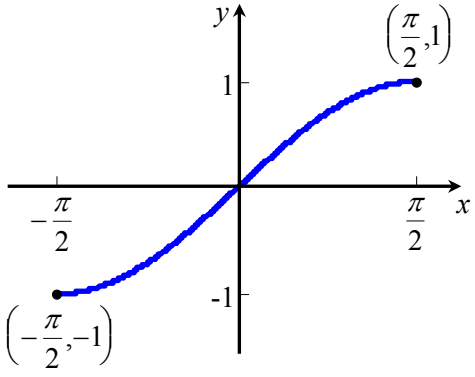




The inverse sine of x

$y = \sin^{-1} x$ means $x = \sin y$

where $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ and $-1 \le x \le 1$

$\sin^{-1}(\sin u) = u$ where $-\frac{\pi}{2} \le u \le \frac{\pi}{2}$

$\sin(\sin^{-1} v) = v$ where $-1 \le v \le 1$

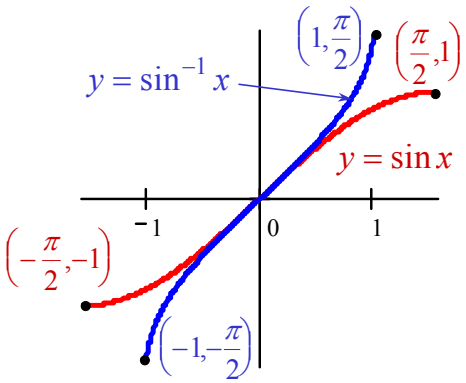
Characteristics of $y = \sin^{-1} x$

Domain of $y = \sin^{-1} x$ is the Range of $y = \sin x$:

$-1 \le x \le 1$

Range of $y = \sin^{-1} x$ is the Domain of $y = \sin x$:

$-\frac{\pi}{2} \le y \le \frac{\pi}{2}$



Find the exact value of $y = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

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

$\sin\theta = \frac{\sqrt{3}}{2}$ $\quad -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$

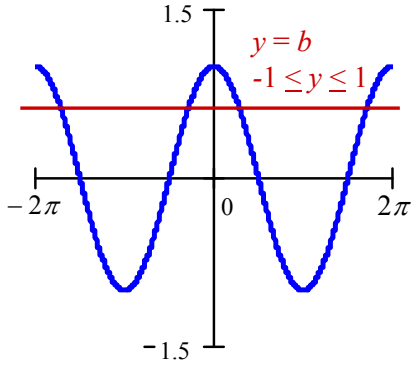
$\theta = y = \frac{\pi}{3}$

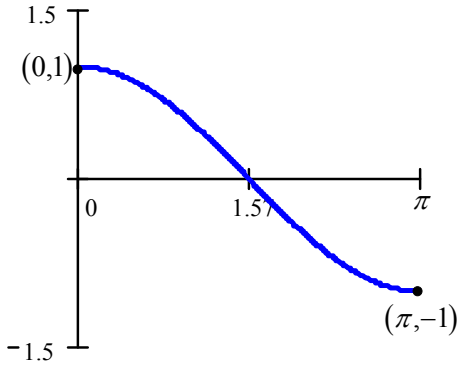
Find the exact value of $\sin^{-1}\left(\frac{-\sqrt{2}}{2}\right)$.

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

$\sin\theta = -\frac{\sqrt{2}}{2}$ $\quad -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$

$\theta = y = -\frac{\pi}{4}$





The inverse cosine of x

$y = \cos^{-1} x$ means $x = \cos y$
where $0 \le y \le \pi$ and $-1 \le x \le 1$

$\cos^{-1}(\cos u) = u$ where $0 \le u \le \pi$

$\cos(\cos^{-1} v) = v$ where $-1 \le v \le 1$

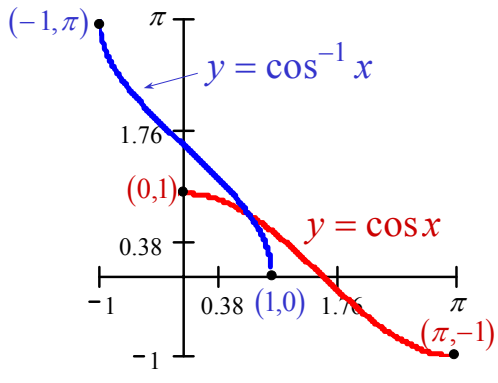
Characteristics of $y = \cos^{-1} x$

Domain of $y = \cos^{-1} x$ is the Range of $y = \cos x$:

$-1 \le x \le 1$

Range of $y = \cos^{-1} x$ is the Domain of $y = \cos x$:

$0 \le y \le \pi$



Find the exact value of $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$.

$\theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ where $0 \le \theta \le \pi$

$\cos\theta = \frac{\sqrt{3}}{2}$ where $0 \le \theta \le \pi$

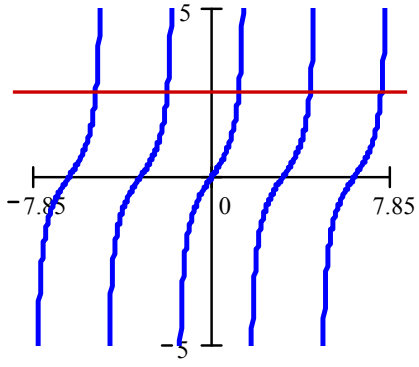
$\theta = \frac{\pi}{6}$

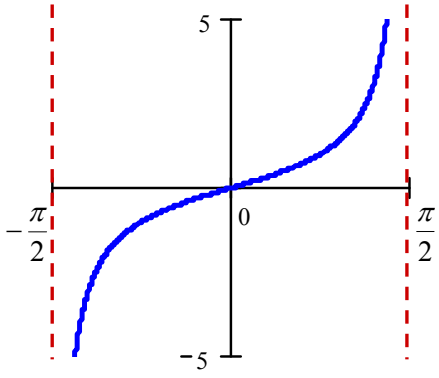
Find the exact value of $\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right)$.

$\theta = \cos^{-1}\left(\frac{-\sqrt{2}}{2}\right)$ where $0 \le \theta \le \pi$

$\cos\theta = \frac{-\sqrt{2}}{2}$ where $0 \le \theta \le \pi$

$\theta = \frac{3\pi}{4}$





The inverse tangent of x

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

where $-\frac{\pi}{2} < y < \frac{\pi}{2}$ and $-\infty < x < \infty$

$\tan^{-1}(\tan u) = u$ where $-\frac{\pi}{2} < u < \frac{\pi}{2}$

$\tan(\tan^{-1} v) = v$ where $-\infty < v < \infty$

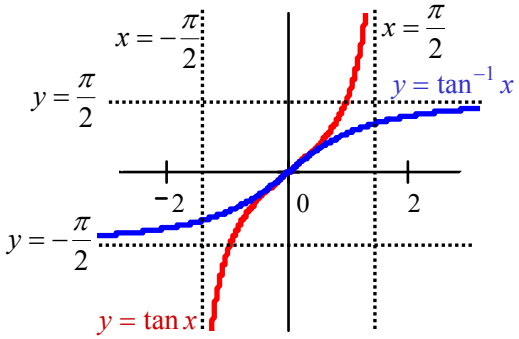
Characteristics of $y = \tan^{-1} x$

Domain of $y = \tan^{-1} x$ is the Range of $y = \tan x$:

$-\infty < x < \infty$

Range of $y = \tan^{-1} x$ is the Domain of $y = \tan x$:

$-\frac{\pi}{2} < y < \frac{\pi}{2}$



Find the exact value of $\tan^{-1}\left(-\sqrt{3}\right)$.

$\theta = \tan^{-1}\left(-\sqrt{3}\right)$ where $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$

$\tan\theta = -\sqrt{3}$ where $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$

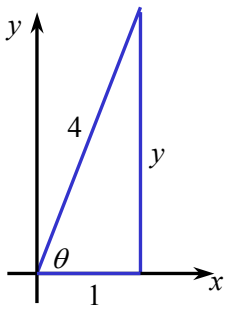
$$\theta = -\frac{\pi}{3}$$

Find the exact value of $\csc\left(\cos^{-1}\frac{1}{4}\right)$.

$\theta = \cos^{-1}\frac{1}{4}$ where $0 \le \theta \le \pi$

$$\cos\theta = \frac{1}{4}$$

$0 \le \theta < \frac{\pi}{2}$ since $\cos\theta = \frac{1}{4} > 0$



$y^2 + 1^2 = 4^2 = 16$

$y = \sqrt{15}$

$\csc\theta = \frac{r}{y}$

$\csc\theta = \frac{4}{\sqrt{15}} = \frac{4\sqrt{15}}{15}$

$\csc\left(\cos^{-1}\frac{1}{4}\right) = \csc\theta = \frac{4\sqrt{15}}{15}$

Use a calculator to approximate $\sec^{-1} 2$

$\theta = \sec^{-1} 2 \quad 0 \le \theta \le \pi,\ \theta \ne \pi/2$

$\sec\theta = 2 \quad 0 \le \theta \le \pi,\ \theta \ne \pi/2$

$\sec\theta = \frac{1}{\cos\theta} = 2 \qquad \cos\theta = \frac{1}{2}$

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