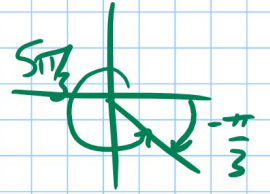
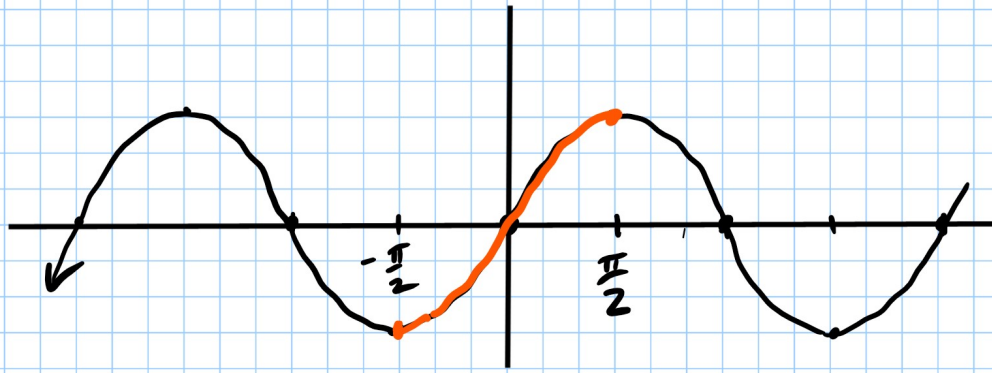


# Section 6.1 Inverse Sine, Cosine, and Tangent



## Inverse Sine

$\sin^{-1}x$  ( $\arcsin x$ ) is asking for angle

between  $-\frac{\pi}{2}$  and  $\frac{\pi}{2}$

whose sine is  $x$

$$\sin^{-1} \frac{\sqrt{2}}{2} = \frac{\pi}{4}$$

## Inverse Cosine

$\cos^{-1}x$  ( $\arccos x$ ) is asking for angle

between  $0$  and  $\pi$

whose cosine is  $x$

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

## Inverse Tangent

$\tan^{-1}x$  ( $\arctan x$ ) is asking for the angle

between  $-\frac{\pi}{2}$  and  $\frac{\pi}{2}$

whose tangent is  $x$

$$\tan^{-1}(-\sqrt{3}) = -\frac{\pi}{3}$$

### sine

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

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

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

$$\sin^{-1}\left(-\frac{1}{2}\right) = -\frac{\pi}{6}$$

$$\sin^{-1}0 = 0$$

$$\sin^{-1}\frac{1}{2} = \frac{\pi}{6}$$

$$\sin^{-1}\frac{\sqrt{2}}{2} = \frac{\pi}{4}$$

$$\sin^{-1}\frac{\sqrt{3}}{2} = \frac{\pi}{3}$$

### cosine

$$\cos^{-1}(-1) = \pi$$

$$\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = \frac{5\pi}{6}$$

$$\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) = \frac{3\pi}{4}$$

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

$$\cos^{-1}0 = \frac{\pi}{2}$$

$$\cos^{-1}\frac{1}{2} = \frac{\pi}{3}$$

$$\cos^{-1}\frac{\sqrt{2}}{2} = \frac{\pi}{4}$$

$$\cos^{-1}\frac{\sqrt{3}}{2} = \frac{\pi}{6}$$

### tangent

$$\tan^{-1}(-\sqrt{3}) = -\frac{\pi}{3}$$

$$\tan^{-1}(-1) = -\frac{\pi}{4}$$

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

$$\tan^{-1}0 = 0$$

$$\tan^{-1}\frac{\sqrt{3}}{3} = \frac{\pi}{6}$$

$$\tan^{-1}1 = \frac{\pi}{4}$$

$$\tan^{-1}\sqrt{3} = \frac{\pi}{3}$$

$$\sin^{-1} 1 = \frac{\pi}{2}$$

$$\cos^{-1} 1 = 0$$

$$\text{ex: } \cos \left( \underbrace{\cos^{-1} \frac{\sqrt{2}}{2}}_{\text{today's chart}} \right) = \underbrace{\cos \frac{\pi}{4}}_{\text{Ch 5 chart}} = \frac{\sqrt{2}}{2}$$

$$\text{ex: } \sin \left( \sin^{-1} \frac{14}{15} \right) = \frac{14}{15}$$

as long as  $\sin$ ,  $\cos$ , or  $\tan$  are on outside of  $\sin^{-1}$ ,  $\cos^{-1}$ , or  $\tan^{-1}$  the functions cancel. \*

\* For  $\sin$  and  $\cos$ , the number has to be between  $-1$  and  $1$ , inclusive, or else it's undefined.

$$\text{ex: } \cos \left( \underbrace{\cos^{-1} \left( -\frac{19}{7} \right)} \right) \text{ is undefined}$$

What happens if inverse is on outside?

$$\cos^{-1} \left( \cos \frac{\pi}{12} \right) = \frac{\pi}{12}$$

↳ as long as it's between  $0$  and  $\pi$  functions can cancel.

$$\sin^{-1} \left( \sin \left( -\frac{\pi}{5} \right) \right) = -\frac{\pi}{5}$$

↳ as long as it's between  $-\frac{\pi}{2}$  and  $\frac{\pi}{2}$

functions can cancel

$$\cos^{-1} \left( \underbrace{\cos \frac{11\pi}{6}}_{\text{chart}} \right) = \cos^{-1} \left( \underbrace{\frac{\sqrt{3}}{2}}_{\text{today's chart}} \right) = \frac{\pi}{6}$$

↳ not between  $0$  and  $\pi$

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

p468 1-35 odd

For calculator problem, you have to be in radian mode.