

INVERSE TRIG FUNCTIONS

$$y = x^3 + 4$$

$$x = \sqrt[3]{y^3 + 4}$$

$$\sqrt[3]{x-4} = \sqrt[3]{y}$$

$$\sqrt[3]{x-4} = f^{-1}$$

$$y = \sin \theta$$

$$\theta = \sin^{-1} y$$

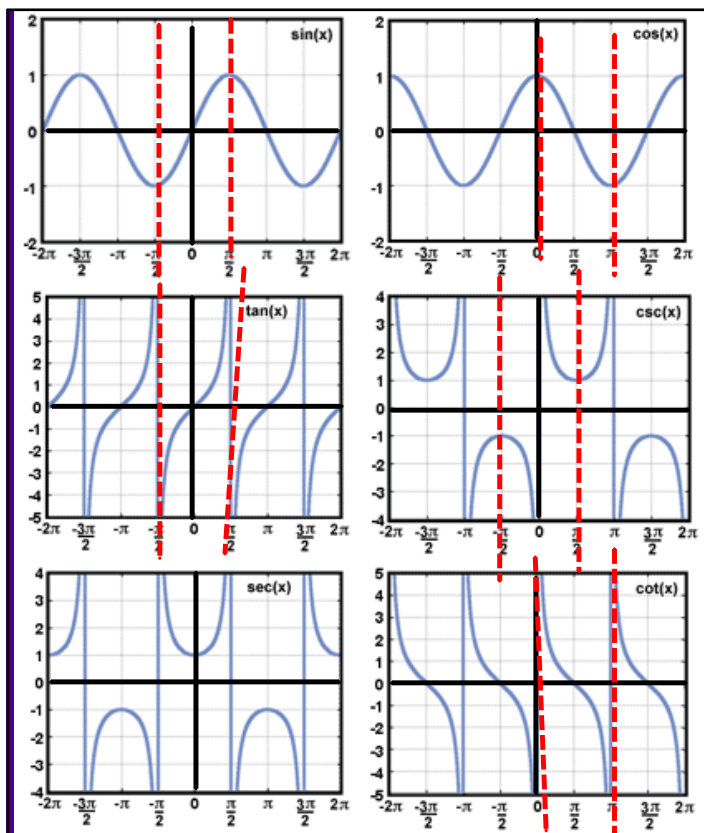
$$\theta = \text{Arcsin } y$$

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

$$\frac{\pi}{6} = \text{Arcsin } \frac{1}{2}$$

- 1) Switch x + y
- 2) Solve for y .

Inverse Trig
functions represent
angles!



Handwritten notes on a purple background:

Top left: A small sketch of a coordinate plane with a green curve and a yellow curve.

Top right: A quadrant diagram with handwritten text:

- Quadrant I: All +
- Quadrant II: $\cos^{-1}x$, $\sec^{-1}x$, $\cot^{-1}x$
- Quadrant III: $\csc^{-1}x$, $\sin^{-1}x$, $\tan^{-1}x$
- Quadrant IV: (empty)

 Arrows point from the text to the respective quadrants.

Middle: Capitalized = Use limited quadrants

Bottom: A large coordinate plane divided into four quadrants by a yellow line:

- Top Left: Cody, Sells, Cocaine
- Top Right: At
- Bottom Right: Crazy, Sexy, Time
- Bottom Left: (empty)

Answers are angles - always in radians!

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



$$\cot^{-1}(-\sqrt{3})$$



$$\frac{5\pi}{6}$$

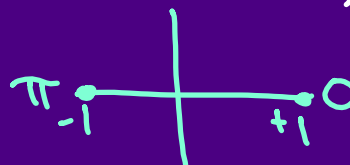
$$\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$$

$\begin{bmatrix} \cos^{-1}x \\ \sec^{-1}x \\ \cot^{-1}x \end{bmatrix}$	All +
$\begin{bmatrix} \csc^{-1}x \\ \sin^{-1}x \\ \tan^{-1}x \end{bmatrix}$	-

$$\arcsin\left(-\frac{\sqrt{3}}{2}\right) = \boxed{-\frac{\pi}{3}}$$




$$\operatorname{Arccsc}(-1) = \boxed{\pi}$$



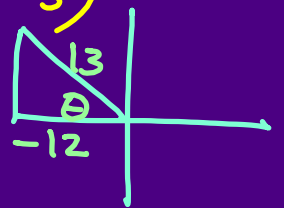
$$\cos(\tan^{-1} \sqrt{3})$$

cos θ

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


$$\sin(\operatorname{Arccot} -\frac{12}{5})$$

sin θ



$$25 + 144 = r^2$$


$$\sqrt{169} = \sqrt{r^2}$$

$$13 = r$$

$$= \frac{y}{r} = \frac{5}{13}$$

$$\sec(\operatorname{Arccsc} \frac{x}{4}) = \frac{r}{y}$$

sec $\theta = \frac{r}{x}$



$$a = \sqrt{x^2 + 16}$$

$$a^2 + 16 = x^2$$

$$\sqrt{a^2} = \sqrt{x^2 - 16}$$

$$\frac{x}{\sqrt{x^2 - 16}}$$

$$\tan(\cos^{-1}(-\frac{7}{9}))$$

tan θ



$$y^2 + 49 = 81$$

$$\sqrt{y^2} = \sqrt{32}$$

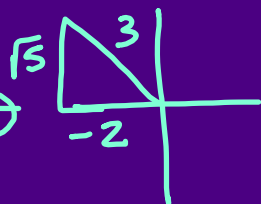
$$y = \pm 4\sqrt{2}$$

$$\tan \theta = \frac{y}{x} = \frac{4\sqrt{2}}{-7}$$

$$\sin \left(2 \arccos \left(\frac{-2}{3} \right) \right) \frac{x}{r}$$

$$\sin(2\theta)$$

$$= 2 \sin \theta \cos \theta$$



$$= 2 \left(\frac{\sqrt{5}}{3} \right) \left(\frac{-2}{3} \right)$$

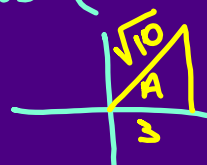
$$y^2 + 4 = 9$$

$$\sqrt{y^2 + 4} = \sqrt{5}$$

$$= \boxed{\frac{-4\sqrt{5}}{9}}$$

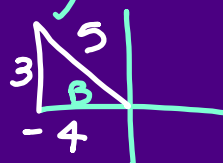
$$\cos \left(\arctan \left(\frac{1}{3} \right) - \operatorname{arccsc} \left(\frac{-5}{4} \right) \right) \frac{r}{x}$$

$$\cos(A - B)$$



$$9 + 1 = r^2$$

$$\sqrt{10} = r$$



$$y^2 + 16 = 25$$

$$\sqrt{y^2 + 16} = \sqrt{9}$$

$$\cos A \cos B + \sin A \sin B$$

$$\left(\frac{3}{\sqrt{10}} \right) \left(\frac{-4}{5} \right) + \left(\frac{1}{\sqrt{10}} \right) \left(\frac{5}{5} \right)$$

$$\frac{-12}{5\sqrt{10}} + \frac{3}{5\sqrt{10}}$$

$$= \boxed{\frac{-9}{5\sqrt{10}}}$$

INVERSE TRIG EQUATIONS ← Has = sign

Solve for x.

$$y = 3 \sin\left(\frac{2}{3}x\right) - 4$$

$$\frac{y+4}{3} = \frac{3 \sin\left(\frac{2}{3}x\right)}{3}$$

$$\frac{y+4}{3} = \sin\left(\frac{2}{3}x\right)$$

$$\cancel{\frac{2}{3}x} = \cancel{\frac{3}{2}} \sin^{-1}\left(\frac{y+4}{3}\right)$$

$$x = \frac{3}{2} \sin^{-1}\left(\frac{y+4}{3}\right)$$

- 1) Isolate Trig func.
- 2) Switch variables using an inverse.
- 3) Check, if needed

$$\frac{3\pi + 4 \tan^{-1} y}{-3\pi} = \frac{2\pi}{-3\pi}$$

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

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

$$\tan\left(-\frac{\pi}{4}\right) = y$$

$$\tan\left(-\frac{\pi}{4}\right) = -1 = y$$

check
guessing