

INVERSE TRIG FUNCTIONS

$$y = x^3 + 4$$

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

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

$$y = \sin \theta$$

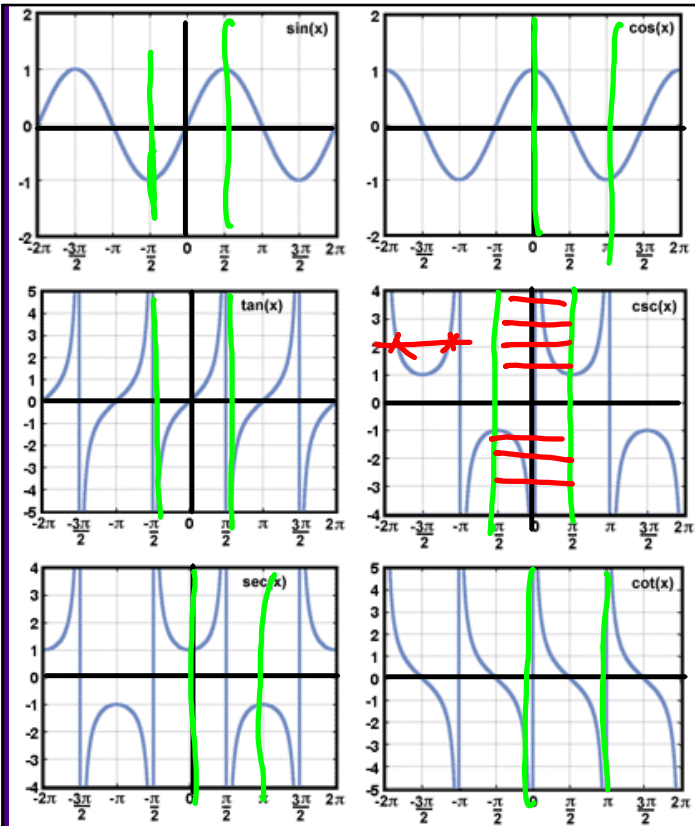
$$\theta = \sin^{-1} y$$

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

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

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

Inverse Trig
functions represent
angles!

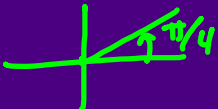


$y = x^2$

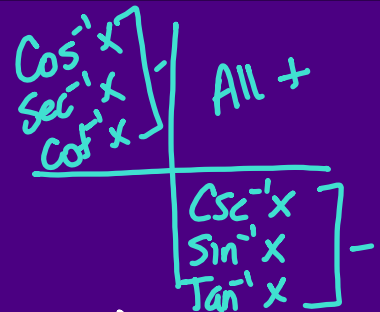
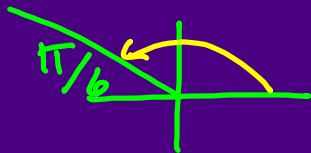
Handwritten notes and diagrams on a purple background:

- Equation:** $y = x^2$
- Graphs:** A coordinate system showing a parabola $y = x^2$ and a coordinate system with various trigonometric functions: $\cos^{-1}x$, $\sec^{-1}x$, $\tan^{-1}x$, $\csc^{-1}x$, $\sin^{-1}x$, and $\tan^{-1}x$.
- Notes:**
 - "Cody Sells Cocaine" (written in green)
 - "All + at" (written in green)
 - "Crazy Sexy time" (written in yellow)
 - " $\pi/2$ " (written in green)
 - " $\pi/2$ " (written in green)

Answers are angles - always in radians!

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


$$\cot^{-1}(-\sqrt{3}) = \frac{5\pi}{6}$$



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



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

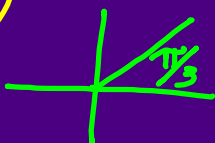


$$\cos(\tan^{-1} \sqrt{3})$$

$$\cos(\theta)$$

$$\cos \frac{\pi}{3}$$

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

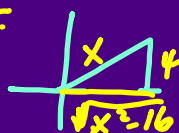


$$\sec(\operatorname{Arccsc} \frac{x}{4})$$

$$= \sec(\theta)$$

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

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



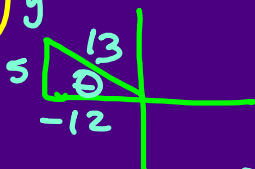
$$a^2 + 16 = x^2$$

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

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

$$\sin(\theta)$$

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



$$25 + 144 = r^2$$

$$169 = r^2$$

$$13 = r$$

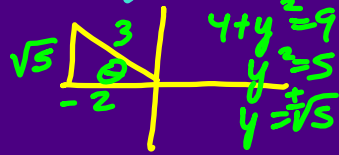
$$\sin\left(2 \operatorname{Arccos}\left(\frac{-2}{3}\right)\right) \frac{x}{r}$$

$$\sin(2\theta)$$

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

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

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



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

$$\cos(A - B)$$



$$9 + 1 = r^2$$

$$\sqrt{10} = r$$

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

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

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

$$= -\frac{9}{5\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{-9\sqrt{10}}{50}$$

INVERSE TRIG EQUATIONS ← Has = sign

Solve for x.

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

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

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

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

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

No sol. ~~$\frac{2\pi}{3}$~~

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

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

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

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

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

$$\boxed{-1 = y}$$

Stop
Check
Limited
Quads