February 25, 2022

Inverse Trig Functions

$y = \sqrt{x^2 - 4}$

$x^2 = \left(\sqrt{y^2 - 4}\right)^2$

$x^2 = y^2 - 4$

$\pm\sqrt{x^2 + 9} = \sqrt{y^2}$

$\pm\sqrt{x^2 + 4} = y$

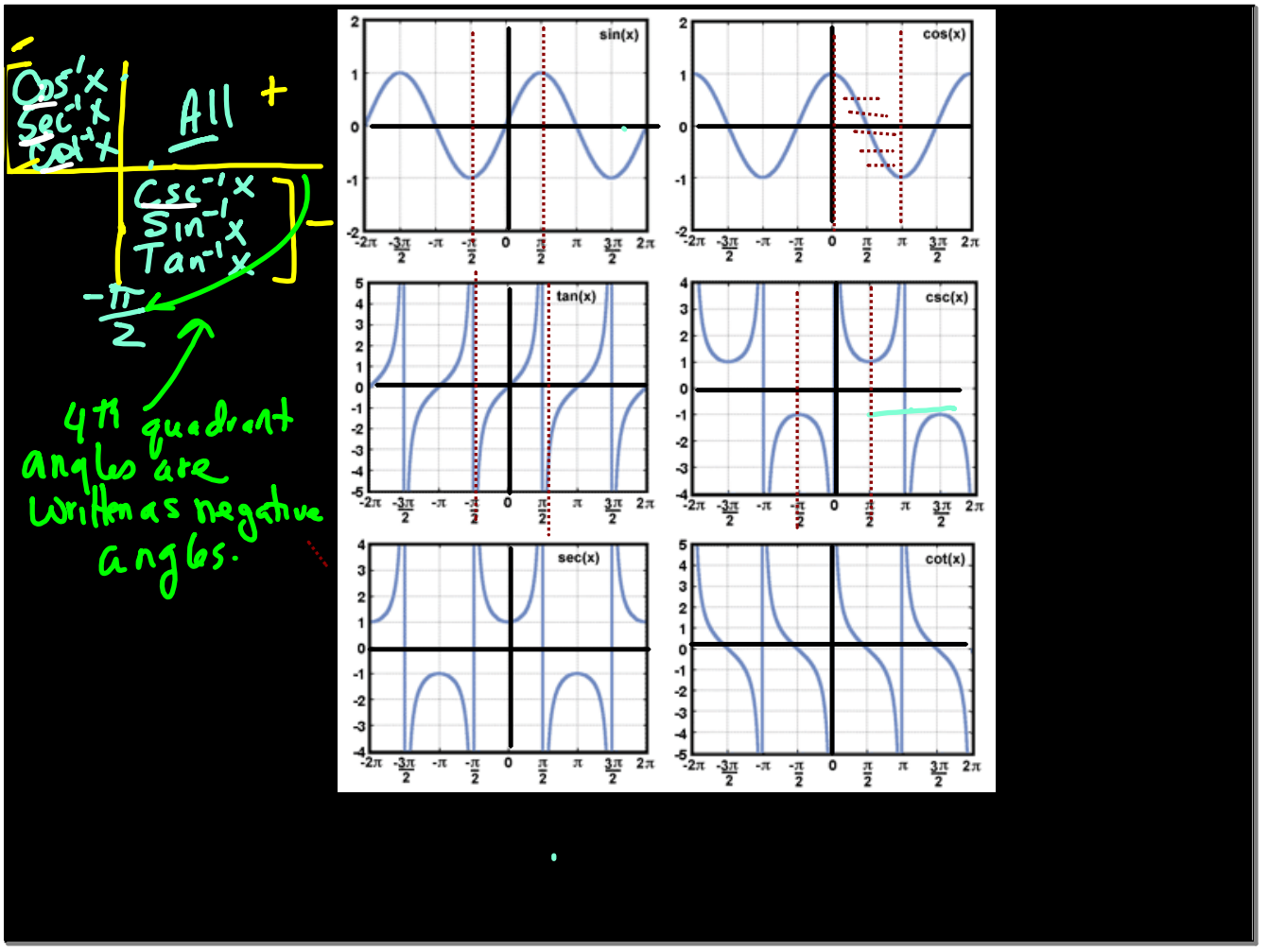
$f \circ g$

$y = \sin\theta$ (✓ value, ✓ angle)

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

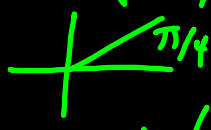
Inverse Trig functions represent angles.

must be in radians!

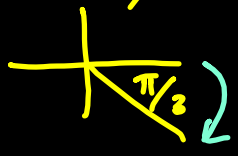

Cos⁻¹x
Sec⁻¹x
Tan⁻¹x
All +
Csc⁻¹x
Sin⁻¹x
Tan⁻¹x
-π/2
4th quadrant angles are written as negative angles.
sin(x)
cos(x)
tan(x)
csc(x)
sec(x)
cot(x)

Evaluate.

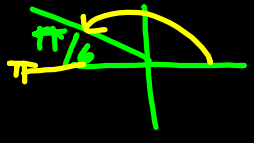
$\cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$



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

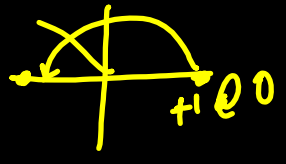


$\text{Arccot}\left(-\sqrt{3}\right) = \frac{5\pi}{6}$

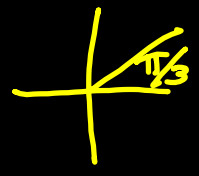


$\tan\theta = \sqrt{3}/3$

$\text{Arcsec}(-1) = \pi$



$\cos\left(\underbrace{\arctan\sqrt{3}}_{\theta}\right)$



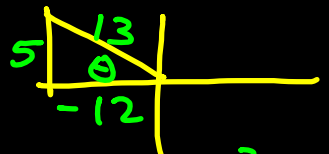
$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

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

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

$\sin\left(\cot^{-1}\left(-\frac{12}{5}\right)\right)$ x y

$\sin(\theta) = \frac{y}{r} = \frac{5}{13}$

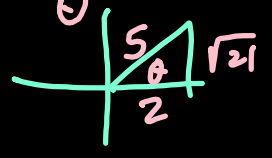


$25 + 144 = r^2$

$169 = r^2$

$13 = r$

$\sec\left(\underbrace{\text{Arccos}\ \frac{2}{5}}_{\theta}\right)$ x r



$4 + y^2 = 25$

$\sqrt{y^2} = \sqrt{21}$

$\sec\theta = \frac{r}{x} = \frac{5}{2}$

$\tan\left(\text{Tan}^{-1}\ -\frac{3}{7}\right) = -\frac{3}{7}$

$\ln e^8 = 8$

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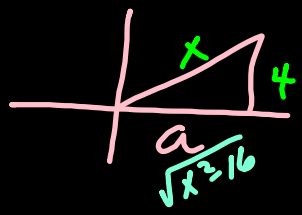
$\sec\left(\text{Arccsc}\ \frac{x}{4}\right)$ $\frac{r}{y}$



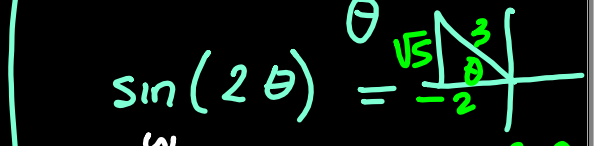
$a^2+16=x^2$

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

$\sec\theta=\frac{r}{x}=\boxed{\frac{x}{\sqrt{x^2-16}}}$

$\sin\left(2\cos^{-1}\left(-\frac{2}{3}\right)\right)$ $\frac{x}{r}$

θ



$\sin(2\theta)=$

$2\sin\theta\cos\theta$ 9/9

$4+y^2=9$

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

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

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

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

$\cos(A-B)$

Draw 2 pictures!

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

Inverse Trig Equations

Solve for x.

$4 + 2\sin(x-3) = 5y$

$-4 \qquad\qquad -4$

$\frac{2\sin(x-3)}{2} = \frac{5y-4}{2}$

$\sin(x-3) = \frac{5y-4}{2}$

$\sin^{-1}\left(\frac{5y-4}{2}\right) = x-3$

$\sin^{-1}\left(\frac{5y-4}{2}\right) + 3 = x$

1) Isolate the trig function.
2) Switch the inside & outside quantities using the inverse.
3) Solve for the needed variable.

Solve for y

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

$-3\pi \qquad\qquad -3\pi$

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

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

Stop! Check quadrant!

$+2\pi$

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

$-1 = y$