Sum & Difference Identities

$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

$\cos(30° + 60°) = \cos 30° \cos 60° - \sin 30° \sin 60°$

$0 = \frac{\sqrt{3}}{2} \cdot \frac{1}{2} - \frac{1}{2} \cdot \frac{\sqrt{3}}{2}$

~~$\cos(30° + 60°) = \cos 30° + \cos 60°$~~

~~$0 = 1\frac{1}{2} + \frac{1}{2}$~~

$\cos(A - B) = \cos A \cos B + \sin A \sin B$

$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$

$\sin(A - B) = \sin A \cos B - \cos A \sin B$

$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$

$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

February 10, 2023

T or F F $\cos(70^\circ - 20^\circ) = \cos 70^\circ - \cos 20^\circ$ ← Massively Illegal!

F $\sin 70^\circ = \sin 20^\circ \cos 50^\circ - \cos 20^\circ \sin 50^\circ$

$= \sin(20^\circ - 50^\circ) = \sin(-30^\circ)$ ∴

T $\tan 110^\circ = \dfrac{\tan 80^\circ + \tan 30^\circ}{1 - \tan 80^\circ \tan 30^\circ} = \tan(80^\circ + 30^\circ)$

$= \tan 110^\circ$

Evaluate. (Answer is a #)

$\sin \frac{5\pi}{4} \cos \frac{\pi}{2} - \cos \frac{5\pi}{4} \sin \frac{\pi}{2}$ = $\sin(A - B)$

$\sin\left(\frac{5\pi}{4} - \frac{\pi}{2}\right)$

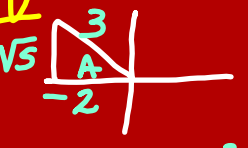
$\sin\left(\frac{3\pi}{4}\right) = \boxed{\frac{\sqrt{2}}{2}}$

February 10, 2023

Find $\cos(A+B)$ given $\tan A = -\frac{\sqrt{5}}{2} = \frac{y}{x}$ $\csc B = -\frac{3}{1} = \frac{r}{y}$

$\frac{\pi}{2} < A < \pi$ and $\frac{3\pi}{2} < B < 2\pi$

II III



$4 + 5 = r^2$

$9 = r^2$

$\pm 3 = r$

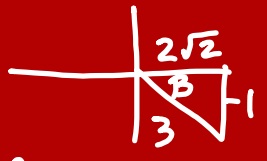
$\cos(A+B) = \cos A \cos B - \sin A \sin B$

$\frac{x}{r}$ $\frac{y}{r}$

$\left(-\frac{2}{3}\right)\left(\frac{2\sqrt{2}}{3}\right) - \left(\frac{\sqrt{5}}{3}\right)\left(\frac{-1}{3}\right)$

$= \frac{-4\sqrt{2}}{9} + \frac{\sqrt{5}}{9}$

$= \boxed{\frac{-4\sqrt{2}+\sqrt{5}}{9}}$



$x^2 + 1 = 9$

$\sqrt{x^2} = \pm\sqrt{8}$

Verify.

$$\frac{\sin(x+y)}{\cos x \cos y} = \tan x + \tan y$$

$$\frac{\sin x \cos y + \cos x \sin y}{\cos x \cos y} = \frac{\cos y \sin x}{\cos y \cos x} + \frac{\sin y \cdot \cos x}{\cos y \cdot \cos x}$$

$$= \frac{\sin x \cos y + \cos x \sin y}{\cos x \cos y}$$

Hint #63 $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$

$\cos(A+B)$

$\cos\frac{\pi}{2}\cos x - \cdots\cdots$

$0 \cdot \cos x$