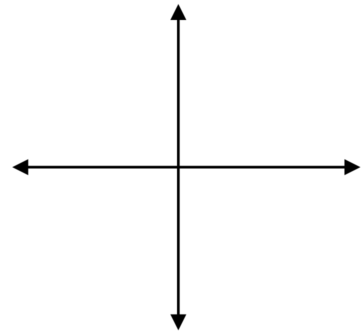
Sum/Difference, Double Angle and Half-Angle Practice

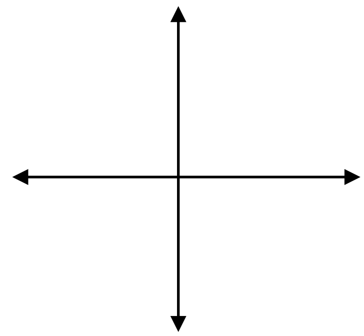
Given $\sin\alpha = \frac{3}{5},\ 0 < \alpha < \frac{\pi}{2},\ \cos\beta = -\frac{5}{13},\ \pi < \beta < \frac{3\pi}{2},$ find

a. $\sin(\alpha + \beta)$

b. $\cos(\alpha + \beta)$

c. $\tan(\alpha + \beta)$



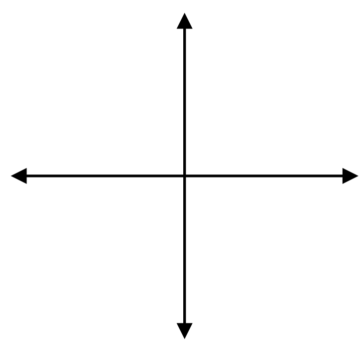


Given that $\tan\theta = -\frac{3}{4}$ and θ is in quadrant II, find the following:

a. $\sin(2\theta)$

b. $\cos(2\theta)$

c. $\tan(2\theta)$



Prove the following identity

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

Prove the following identity

$$\sin(x+y)\cdot \sin(x-y) = \sin^2 x - \sin^2 y$$

Prove the following identity

$$\cos(\alpha-\beta) - \cos(\alpha+\beta) = 2\sin\alpha \cdot \sin\beta$$

Prove the following identity

$$\sin\alpha + \sin\left(\alpha + \frac{2}{3}\pi\right) + \sin\left(\alpha + \frac{4}{3}\pi\right) = 0$$

Prove the following identity

$$\frac{1-\cos^2 x}{\sin 2x} = \frac{1}{2}\tan x$$

Prove the following identity

$$\tan x = \frac{\sin 2x}{1+\cos 2x}$$

Prove the following identity

$$\sec 2x = \frac{1}{1-2\sin^2 x}$$

Prove the following identity

$$\frac{\cot^2 x - 1}{\csc^2 x} = \cos 2x$$

If $A+B+C=\pi$, and $A+B=\pi-C$, then $\tan(A+B)=\tan(\pi-C)$. Using these relations to prove that: $\tan A + \tan B + \tan C = \tan A \cdot \tan B \cdot \tan C$.

Prove the following identity

$$\frac{\sin(x-y)}{\cos x \cos y}+\frac{\sin(y-z)}{\cos y \cos z}+\frac{\sin(z-x)}{\cos z \cos x}=0$$

A ball attached to a spring is raised 2 feet and released with an initial vertical velocity of 3 feet per second. The distance of the ball from its rest position after t seconds is given by $d = 2 \cos t + 3 \sin t$. Show that

$$2\cos t + 3\sin t = \sqrt{13}\cos(t-\theta)$$

where θ lies in quadrant I and $\tan\theta = \frac{3}{2}$

Use Sum/Difference Formulas to give the exact value of the trigonometric ratios below. Confirm you solution using a calculator

$\sin 195°$

$\cos -15°$

$\tan \frac{5\pi}{12}$

Use Half Angle Formulas to give the exact value of the trigonometric ratios below. Confirm you solution using a calculator

$\sin \frac{5\pi}{12}$

$\cos \frac{7\pi}{8}$

$\tan 22.5°$