

SUM + PRODUCT IDENTITIES

Purpose - to change between addition/subtraction of $\sin x + \cos x$ to multiplication of $\sin x / \cos x$.

$$\begin{aligned}\sin 40^\circ - \sin 100^\circ &= 2 \cos \left(\frac{40^\circ + 100^\circ}{2} \right) \sin \left(\frac{40^\circ - 100^\circ}{2} \right) \\ &= 2 \cos 70^\circ \sin (-30^\circ) \\ &= -2 \cos 70^\circ \sin 30^\circ\end{aligned}$$

$$\begin{aligned}\cos 4x \sin 12x &= \frac{1}{2} \left[\sin(4x + 12x) - \sin(4x - 12x) \right] \\ &= \frac{1}{2} \left[\sin(16x) + \sin(8x) \right]\end{aligned}$$

IDENTITIES REVIEW

1-10 T-False (6 T/F)

11-14 Evaluate (3)

15-20 1) Write out identity (2-3)
2) Draw pic(s)


21-31 Verify  1 Easy
2 Medium
1 Challenging

Evaluate

$$\begin{aligned} & \cos^2 75^\circ - \sin^2 75^\circ \\ &= \cos(2 \cdot 75^\circ) \\ &= \cos 150^\circ \end{aligned}$$



$$= -\frac{\sqrt{3}}{2}$$

Find $\sin\left(\frac{x}{2}\right)$. 

given $\tan x = -\frac{3}{4}$ x in Q.IV.

$$\sin\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 - \cos x}{2}}$$

$270^\circ < x < 360^\circ$
 $135^\circ < \frac{x}{2} < 180^\circ$
 Q.II

$$+ \sqrt{\frac{1 - \frac{4}{5}}{2}}$$

$$\begin{aligned} & \sqrt{\frac{\frac{1}{5}}{2} \cdot \frac{1}{2}} = \sqrt{\frac{1}{10}} \\ &= \frac{1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} \end{aligned}$$

$$+ \frac{\sqrt{10}}{10}$$