

Sum/Difference Identities

$$\sin(\alpha \pm \beta) = \sin\alpha \cos\beta \pm \cos\alpha \sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha \cos\beta \mp \sin\alpha \sin\beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha \tan\beta}$$

Example 1: Use the sum and difference identities to find the exact value of sin/cos/tan

$$15^\circ = (45^\circ - 30^\circ)$$

a. $\sin 15^\circ$

b. $\cos 15^\circ$

c. $\tan 15^\circ$

Example 2: Rewrite the expression using sin, cos, or tan: $\sin 340^\circ \cos 50^\circ - \cos 340^\circ \sin 50^\circ$

Example 3: Find the exact value of the trig function given:

$$\begin{aligned}\sin u &= \frac{5}{13} & 0 < u < \frac{\pi}{2} \\ \cos v &= \frac{3}{5} & \frac{3\pi}{2} < v < 2\pi\end{aligned}$$

Find $\cos(u + v)$

Example 4: Verify $\sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right) = \sin x$