

Section 5.4 Sum and Difference Formulas

Objective: In this lesson you learned how to use sum and difference formulas to rewrite and evaluate trigonometric functions.

Course Number

Instructor

Date

I. Using Sum and Difference Formulas (Pages 398–401)

List the **sum and difference formulas** for sine, cosine, and tangent.

$$\sin(u + v) = \sin u \cos v + \cos u \sin v$$

$$\sin(u - v) = \sin u \cos v - \cos u \sin v$$

$$\cos(u + v) = \cos u \cos v - \sin u \sin v$$

$$\cos(u - v) = \cos u \cos v + \sin u \sin v$$

$$\tan(u + v) = (\tan u + \tan v)/(1 - \tan u \tan v)$$

$$\tan(u - v) = (\tan u - \tan v)/(1 + \tan u \tan v)$$

What you should learn

How to use sum and difference formulas to evaluate trigonometric functions, verify identities, and solve trigonometric equations

Example 1: Use a sum or difference formula to find the exact value of $\tan 255^\circ$.

$$(9 + 6\sqrt{3} + 3)/6$$

Example 2: Find the exact value of $\cos 95^\circ \cos 35^\circ + \sin 95^\circ \sin 35^\circ$.

$$1/2$$

A **reduction formula** is an expression involving only $\sin \theta$ or $\cos \theta$ that is derived from the use of sum and difference formulas to rewrite expressions such as $\sin(\theta + n\pi/2)$ or $\cos(\theta + n\pi/2)$, where n is an integer.

Example 3: Derive a reduction formula for $\sin\left(t + \frac{\pi}{2}\right)$.

$$\sin(t + \pi/2) = \cos t$$

Example 4: Find all solutions of $\cos\left(x - \frac{\pi}{3}\right) + \cos\left(x + \frac{\pi}{3}\right) = 1$ in the interval $[0, 2\pi)$.

$$x = 0$$

Additional notes

Homework Assignment

Page(s)

Exercises