

Math 150 Lecture Notes

Addition and Subtraction Formulas

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

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

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

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

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

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

Sums of Sines and Cosines

If a and b are real numbers, then $a \sin A + b \cos A = \sqrt{a^2 + b^2} \sin(x + \phi)$ and ϕ satisfies

$$\cos \phi = \frac{a}{\sqrt{a^2 + b^2}} \quad \text{and} \quad \sin \phi = \frac{b}{\sqrt{a^2 + b^2}}$$

Example 1: Use an addition or subtraction formula to find the exact value of each expression.

$$\cos 75^\circ$$

$$\tan 195^\circ$$

$$\cos \frac{19\pi}{12}$$

$$\sin \left(-\frac{\pi}{12} \right)$$

Example 2: Use an addition or subtraction formula to write the expression as a trigonometric function of one number. Find the exact value.

$$\sin 10^\circ \cos 80^\circ + \cos 10^\circ \sin 80^\circ$$

$$\cos \frac{13\pi}{15} \cos \left(-\frac{\pi}{5} \right) + \sin \frac{13\pi}{15} \sin \left(-\frac{\pi}{5} \right)$$

Example 3: Prove the identity: $\tan\left(x - \frac{\pi}{4}\right) = \frac{\tan x - 1}{\tan x + 1}$

Example 4: Express the function in terms of sine only. Graph the function.

$$F(x) = \cos x + \sin x$$

