

Notes (5.5)---Sum & Difference Formulas

Sum & Difference Formulas:

$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$

Note the sign switch

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

Note that the sign does *not* switch

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

EXAMPLE 1

Using the Cosine-of-a-Difference Identity

Find the exact value of $\cos 15^\circ$ without a calculator.

EXAMPLE 2

Confirming Cofunction Identities

Prove the identities

(a) $\cos(\pi/2 - x) = \sin x$ & **(b)** $\sin(\pi/2 - x) = \cos x$.

EXAMPLE 3 Using the Sum/Difference Formulas

Write each of the following expressions as the sin or cos of ONE angle

(a) $\sin 22^\circ \cos 13^\circ + \cos 22^\circ \sin 13^\circ$

EXAMPLE 4 Proving Formulas

Prove the formulas:

(a) $\sin(x + \pi) = -\sin x$

(b) $\cos(\pi/3) \cos(\pi/4) - \sin(\pi/3) \sin(\pi/4)$

(b) $\cos\left(x + \frac{3\pi}{2}\right) = \sin x$

(c) $\sin x \sin 2x - \cos x \cos 2x$

(c) $\tan(\theta - (3\pi/2)) = -\cot \theta$

EXAMPLE 5 Using the Sum/Difference identities

Find the exact value of each of the following without a calculator.

(a) $\sin(195^\circ)$

(b) $\tan\left(\frac{13\pi}{12}\right)$

(c) $\sec\left(-\frac{5\pi}{12}\right)$