

Section 7.5

Sum and Difference Formulas

Sum and Difference Formulas for Cosines

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

Sum and Difference Formulas for Sines

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

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

Sum and Difference Formulas for Tangents

$$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$$

$$\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$$

EXAMPLE Establishing an Identity

Establish the identity: $\cos\left(\frac{\pi}{2} + \theta\right) = -\sin \theta$

$$\cos \frac{\pi}{2} \cos \theta - \sin \frac{\pi}{2} \sin \theta =$$

$$0 \cdot \cos \theta - 1 \sin \theta =$$

$$-\sin \theta =$$

EXAMPLE Establishing an Identity

Prove the identity: $\tan(2\pi - \theta) = -\tan \theta$

$$\frac{\tan 2\pi - \tan \theta}{1 + \tan 2\pi \tan \theta} =$$

$$\frac{-\tan \theta}{1} =$$

$$-\tan \theta =$$