Precal Name:_____

Notes (5.6)---Multiple & Half Angle Formulas

Double-Angle Identities

$$\sin 2u = 2 \sin u \cos u$$

$$\cos 2u = \begin{cases} \cos^2 u - \sin^2 u \\ 2\cos^2 u - 1 \\ 1 - 2\sin^2 u \end{cases}$$

$$\tan 2u = \frac{2 \tan u}{1 - \tan^2 u}$$

Power-Reducing Identities

$$\sin^2 u = \frac{1 - \cos 2u}{2}$$

$$\cos^2 u = \frac{1 + \cos 2u}{2}$$

$$\tan^2 u = \frac{1 - \cos 2u}{1 + \cos 2u}$$

Half-Angle Identities

$$\sin \frac{u}{2} = \pm\sqrt{\frac{1 - \cos u}{2}}$$

$$\cos \frac{u}{2} = \pm\sqrt{\frac{1 + \cos u}{2}}$$

$$\tan \frac{u}{2} = \begin{cases} \pm\sqrt{\dfrac{1 - \cos u}{1 + \cos u}} \\ \dfrac{1 - \cos u}{\sin u} \\ \dfrac{\sin u}{1 + \cos u} \end{cases}$$

EXAMPLE 1 Proving a Double-Angle Identity

Prove the identity: $\sin 2u = 2 \sin u \cos u$.

EXAMPLE 2 Proving an Identity

Prove the identity: $\cos^4 \theta - \sin^4 \theta = \cos 2\theta$.

EXAMPLE 3 Reducing a Power of 4

Rewrite $\cos^4 x$ in terms of trigonometric functions with no power greater than 1.

EXAMPLE 4 Using a Double-Angle Identity

Solve algebraically in the interval $[0, 2\pi)$: $\sin 2x = \cos x$.

EXAMPLE 5 Using Half-Angle Identities

Solve $\sin^2 x = 2 \sin^2 (x/2)$.