

Lesson 7.3: Double/Half Angle Identities & Product-Sum Formula

Double Angle Formulas

Sine	
Cosine	
Tangent	

Examples:

1. If $\cos(x) = -\frac{2}{3}$ and x is in Quadrant II, find $\cos(2x)$ and $\sin(2x)$.

2. Write $\cos(3x)$ in terms of $\cos(x)$.

3. Prove the identity $\frac{\sin(3x)}{\sin(x)\cos(x)} = 4\cos(x) - \sec(x)$

Half Angle Formulas

Sine	
Cosine	
Tangent	

Examples:

1. Find the exact value of $\sin(22.5^\circ)$.
2. Find $\tan\left(\frac{u}{2}\right)$ if $\sin(u) = \frac{2}{5}$ and u is in Quadrant II.
3. Evaluate $\sin(2\theta)$, where $\cos(\theta) = -\frac{2}{5}$ with θ in Quadrant II.

Product-to-Sum Formulas

Examples:

1. Express $\sin(3x) \sin(5x)$ as a sum of trigonometric functions.

Sum-to-Product Formulas

Examples:

1. Write $\sin(7x) + \sin(3x)$ as a product.

2. Verify the identity $\frac{\sin(3x) - \sin(x)}{\cos(3x) + \cos(x)} = \tan(x)$.