

Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 3x = 4 \cos^3 x - 3 \cos x$

2) $\frac{1 + \cos 2x}{2 \cot x} =$

3) $\frac{\sin 2x}{\sin^2 x} = 2 \cot x$

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Verify - Double & Half-Angle Identities

Verify the following.

4) $\frac{\tan 2x}{2 \tan x} = \frac{1}{1 - \tan^2 x}$

5) $2 \tan x \sin^2 \frac{x}{2}$

6) $\cos^4 x - \sin^4 x$

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Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 3x = 4 \cos^3 x - 3 \cos x$

$$\cos 3x = \cos (2x + x)$$

$$= \cos 2x \cos x - \sin 2x \sin x$$

Using sum identity

$$= (2 \cos^2 x - 1) \cos x - 2 \sin x \cos x \sin x$$

Using double-angle identities
Multiply

$$= 2 \cos^3 x - \cos x - 2 \cos x \sin^2 x$$

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Using Pythagorean identity
multiply
simplify

2) $\frac{1 + \cos 2x}{2 \cot x} =$

$$\frac{1 + \cos 2x}{2 \cot x} =$$

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Using double-angle identity
Using quotient identity
Simplify

3) $\frac{\sin 2x}{\sin^2 x} = 2 \cot x$

$$\frac{\sin 2x}{\sin^2 x} = \frac{2 \sin x \cos x}{\sin^2 x}$$

Using double-angle identity

$$= 2 \cot x$$

Using quotient identity

Verify - Double & Half-Angle Identities

Verify the following.

$$4) \quad \frac{\tan 2x}{2 \tan x} = \frac{1}{1 - \tan^2 x}$$

$$\frac{\tan 2x}{2 \tan x} = \left(\frac{2 \tan x}{1 - \tan^2 x} \right) \left(\frac{1}{2 \tan x} \right)$$

Using double-angle identity

$$= \left(\frac{2 \tan x}{1 - \tan^2 x} \right) \left(\frac{1}{2 \tan x} \right)$$

Cancel the common factors

$$5) \quad 2 \tan x \sin^2 \frac{x}{2}$$

$$2 \tan x \sin^2 \frac{x}{2}$$

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half-angle identity

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access.

the common factors

quotient identity &
the common factors

$$6) \quad \cos^4 x - \sin^4 x =$$

$$\cos^4 x - \sin^4 x$$

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$(a^2 - b^2) = (a + b)(a - b)$

$$= 1 (\cos^2 x - \sin^2 x)$$

Using Pythagorean identity

$$= \cos 2x$$

Using double-angle identity