



Exercise 5.5 : Solutions of Questions on Page Number : 178

Q1 : Differentiate the function with respect to x .

$$\cos x \cdot \cos 2x \cdot \cos 3x$$

Answer :

$$\text{Let } y = \cos x \cdot \cos 2x \cdot \cos 3x$$

Taking logarithm on both the sides, we obtain

$$\log y = \log (\cos x \cdot \cos 2x \cdot \cos 3x)$$

$$\Rightarrow \log y = \log (\cos x) + \log (\cos 2x) + \log (\cos 3x)$$

Differentiating both sides with respect to x , we obtain

$$\frac{1}{y} \frac{dy}{dx} = \frac{1}{\cos x} \cdot \frac{d}{dx} (\cos x) + \frac{1}{\cos 2x} \cdot \frac{d}{dx} (\cos 2x) + \frac{1}{\cos 3x} \cdot \frac{d}{dx} (\cos 3x)$$

$$\Rightarrow \frac{dy}{dx} = y \left[-\frac{\sin x}{\cos x} - \frac{\sin 2x}{\cos 2x} \cdot \frac{d}{dx} (2x) - \frac{\sin 3x}{\cos 3x} \cdot \frac{d}{dx} (3x) \right]$$

$$\therefore \frac{dy}{dx} = -\cos x \cdot \cos 2x \cdot \cos 3x [\tan x + 2 \tan 2x + 3 \tan 3x]$$

***** END *****