

Answer on Question # 75489 – Math – Trigonometry

Question

- (1) Using an identity from this section, write $\sin 7x - \sin 3x$ as a product.
- (2) Using an identity from this section, find the exact value of $\sin 105^\circ \sin 15^\circ$
- (3) Using an identity from this section, find the exact value of $\sin 195^\circ \cos 75^\circ$
- (4) Using identities from this section, verify the identity $\cos t - \cos 3t$ over $\sin t + \sin 3t = \tan t$.
- (5) Using an identity from this section, write $\sin 7x \sin 3x$ as a sum or a difference.

Solution

- $\sin 7x - \sin 3x = 2 \cos 5x \sin 2x$
- $\sin 105^\circ \sin 15^\circ = \frac{1}{2} [\cos 90^\circ - \cos 120^\circ] = \frac{1}{2} \times \left(-\frac{1}{2}\right) = -\frac{1}{4}$
- $\sin 195^\circ \cos 75^\circ = \frac{1}{2} [\sin 270^\circ + \sin 120^\circ] = \frac{1}{2} \left[-1 + \frac{\sqrt{3}}{2}\right] = \frac{-2+\sqrt{3}}{4}$
- $\frac{\cos t - \cos 3t}{\sin t + \sin 3t} = \frac{2 \sin 2t \sin t}{2 \sin 2t \cos t} = \frac{\sin t}{\cos t} = \tan t$
- $\sin 7x \sin 3x = \frac{1}{2} [\cos 4x - \cos 10x]$

Answer: 1. Product form of $\sin 7x - \sin 3x$ is $2 \cos 5x \sin 2x$

- Exact value of $\sin 105^\circ \sin 15^\circ$ is $-\frac{1}{4}$
- Exact value of $\sin 195^\circ \cos 75^\circ$ is $\frac{-2+\sqrt{3}}{4}$
- $\frac{\cos t - \cos 3t}{\sin t + \sin 3t} = \tan t$ (verified).
- Expression of $\sin 7x \sin 3x$ as a difference is $\frac{1}{2} [\cos 4x - \cos 10x]$