

Giải bài 7 trang 160 sgk toán Đại Số lớp 10

Đề bài:

Chứng minh các hệ thức sau

- a) $\frac{1-2\sin^2 a}{1+\sin 2a} = \frac{1-\tan a}{1+\tan a}$
- b) $\frac{\sin a + \sin 3a + \sin 5a}{\cos a + \cos 3a + \cos 5a} = \tan 3a$
- c) $\frac{\sin^4 a - \cos^4 a + \cos^2 a}{2(1-\cos a)} = \cos^2 \frac{a}{2}$
- d) $\frac{\tan 2x \tan x}{\tan 2x - \tan x} = \sin 2x$

Đáp án:

$$\begin{aligned} \text{a)} \quad & \frac{1-2\sin^2 a}{1+\sin 2a} \\ &= \frac{\cos^2 a - \sin^2 a}{\cos^2 a + \sin^2 a + 2\sin a \cos a} \\ &= \frac{\cos a - \sin a}{\cos a + \sin a} = \frac{1 - \frac{\sin a}{\cos a}}{1 + \frac{\sin a}{\cos a}} \\ &= \frac{1 - \tan a}{1 + \tan a} \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & \frac{\sin a + \sin 3a + \sin 5a}{\cos a + \cos 3a + \cos 5a} \\ &= \frac{2\sin \frac{a+5a}{2} \cos \frac{5a-a}{2} + \sin 3a}{2\cos \frac{a+5a}{2} \cos \frac{5a-a}{2} + \cos 3a} \\ &= \frac{\sin 3a(1 + 2\cos 2a)}{\cos 3a(1 + 2\cos 2a)} \\ &= \tan 3a \end{aligned}$$

$$\begin{aligned}
 c) \quad & \frac{\sin^4 a - \cos^4 a + \cos^2 a}{2(1 - \cos a)} \\
 &= \frac{(\sin^2 a + \cos^2 a)(\sin^2 a - \cos^2 a) + \cos^2 a}{2(1 - \cos a)} \\
 &= \frac{\sin^2 a - \cos^2 a + \cos^2 a}{4\sin^2 \frac{a}{2}} \\
 &= \frac{4\sin^2 \frac{a}{2} \cos^2 \frac{a}{2}}{4\sin^2 \frac{a}{2}} \\
 &= \cos^2 \frac{a}{2}
 \end{aligned}$$

$$\begin{aligned}
 d) \quad & \frac{\tan 2x \tan x}{\tan 2x - \tan x} \\
 &= \frac{\frac{2 \tan x}{1 - \tan^2 x} \cdot \tan x}{\frac{2 \tan x}{1 - \tan^2 x} - \tan x} \\
 &= \frac{2 \tan x}{\tan^2 x + 1} \\
 &= \sin 2x
 \end{aligned}$$