

Problemas – Tema 2

Solución a problemas de Trigonometría - Hoja 8- Problemas 5

Hoja 8. Problema 5

Resuelto por Javier de Orbe (noviembre 2014)

5. Demuestra

$$\text{a) } \frac{\operatorname{sen}(2x)}{1+\cos(2x)} = \tan x$$

$$\text{b) } \frac{\operatorname{sen} a + \operatorname{sen}(3a)}{\cos a - \cos(3a)} = \cotan a$$

$$\text{a) } \frac{\operatorname{sen}(2x)}{1+\cos(2x)} = \frac{2 \operatorname{sen} x \cos x}{1+(\cos^2 x - \operatorname{sen}^2 x)}$$

$$\frac{2 \operatorname{sen} x \cos x}{(\operatorname{sen}^2 x + \cos^2 x) + (\cos^2 x - \operatorname{sen}^2 x)}$$

$$\frac{2 \operatorname{sen} x \cos x}{2 \cos^2 x} = \frac{\operatorname{sen} x \cos x}{\cos x \cos x} = \frac{\operatorname{sen} x}{\cos x} = \tan(x)$$

$$\text{b) } \frac{\operatorname{sen} a + \operatorname{sen}(3a)}{\cos a - \cos(3a)} = \frac{\operatorname{sen} a + \operatorname{sen}(2a+a)}{\cos a - \cos(2a+a)}$$

$$\frac{\operatorname{sen} a + [\operatorname{sen}(2a) \cdot \cos a + \cos(2a) \cdot \operatorname{sen} a]}{\cos a - [\cos(2a) \cdot \cos a - \operatorname{sen}(2a) \cdot \operatorname{sen} a]}$$

$$\frac{\operatorname{sen} a + [(2 \operatorname{sen} a \cdot \cos a) \cdot \cos a + (\cos^2 a - \operatorname{sen}^2 a) \cdot \operatorname{sen} a]}{\cos a - [(\cos^2 a - \operatorname{sen}^2 a) \cdot \cos a - (2 \operatorname{sen} a \cdot \cos a) \cdot \operatorname{sen} a]}$$

$$\frac{\operatorname{sen} a + 2 \operatorname{sen} a \cdot \cos^2 a + \operatorname{sen} a \cdot \cos^2 a - \operatorname{sen}^3 a}{\cos a - \cos^3 a + \cos a \cdot \operatorname{sen}^2 a + 2 \operatorname{sen}^2 a \cdot \cos a}$$

$$\frac{\operatorname{sen} a \cdot (1 + 2 \cos^2 a + \cos^2 a - \operatorname{sen}^2 a)}{\cos a \cdot (1 - \cos^2 a + \operatorname{sen}^2 a + 2 \operatorname{sen}^2 a)}$$

$$\frac{\operatorname{sen} a \cdot (\operatorname{sen}^2 a + \cos^2 a + 3 \cos^2 a - \operatorname{sen}^2 a)}{\cos a \cdot (\operatorname{sen}^2 a + \cos^2 a - \cos^2 a + 3 \operatorname{sen}^2 a)}$$

$$\frac{\operatorname{sen} a \cdot (4 \cos^2 a)}{\cos a \cdot (4 \operatorname{sen}^2 a)} = \frac{4 \operatorname{sen} a \cdot \cos^2 a}{4 \cos a \cdot \operatorname{sen}^2 a} = \frac{\cos a}{\operatorname{sen} a} = \operatorname{cotan} a$$