

Examen de Matemáticas 1º de Bachillerato

Noviembre 2015

Problema 1 Encontrar todas las razones trigonométricas de $\alpha \in \left[\frac{\pi}{2}, \pi\right]$, sabiendo que $\cot \alpha = -1/5$

Solución:

$$\cot \alpha = -\frac{1}{5} \implies \tan \alpha = -5$$

$$\tan^2 \alpha + 1 = \sec^2 \alpha \implies \sec \alpha = -\sqrt{26} \implies \cos \alpha = -\frac{\sqrt{26}}{26}$$

$$1 + \cot^2 \alpha = \csc^2 \alpha \implies \csc \alpha = \frac{\sqrt{26}}{5} \implies \sin \alpha = \frac{5\sqrt{26}}{26}$$

Problema 2 Resolver la siguiente ecuación trigonométrica

$$3 \cos 2x + 7 \sin x - 5 = 0$$

Solución:

$$3 \cos 2x + 7 \sin x - 5 = 0 \implies 3(\cos^2 x - \sin^2 x) + 7 \sin x - 5 = 0 \implies$$

$$3(1 - \sin^2 x - \sin^2 x) + 7 \sin x - 5 = 0 \implies 6 \sin^2 x - 7 \sin x + 2 = 0$$

$$(t = \sin x) \implies 6t^2 - 7t + 2 = 0 \implies t = \frac{1}{2}, \quad t = \frac{2}{3}$$

$$\sin x = \begin{cases} \frac{1}{2} \implies \begin{cases} x = 30^\circ + 2k\pi \\ x = 150^\circ + 2k\pi \end{cases} & k \in \mathbb{Z} \\ \frac{2}{3} \implies \begin{cases} x = 41^\circ 17' 59'' + 2k\pi \\ x = 138^\circ 42' 01'' + 2k\pi \end{cases} & k \in \mathbb{Z} \end{cases}$$

Problema 3 Demostrar que:

$$\sin(2\alpha) = \frac{2 \tan \alpha}{1 + \tan^2 \alpha}$$

Solución:

$$\frac{2 \tan \alpha}{1 + \tan^2 \alpha} = \frac{\frac{2 \sin \alpha}{\cos \alpha}}{1 + \frac{\sin^2 \alpha}{\cos^2 \alpha}} = \frac{\frac{2 \sin \alpha}{\cos \alpha}}{\frac{\cos^2 \alpha + \sin^2 \alpha}{\cos^2 \alpha}} = 2 \sin \alpha \cos \alpha = \sin 2\alpha$$

Problema 4 Enunciar y demostrar el teorema del coseno.

Solución:(Ver Teoría)