

**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:**

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

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

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

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

**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)