

Los ejercicios 1 a 3, 9 y 11 están resueltos en la hoja de portada

$$4.- 1 + \operatorname{ctg}^2(-\alpha) = \operatorname{cosec}^2 \alpha$$

Recuerda:  $\cot(-\alpha) = -\cot \alpha$

$$1 + (-\cot \alpha)^2 = 1 + \cot^2 \alpha = \operatorname{cosec}^2 \alpha$$

$$5.- \cos \alpha (\operatorname{tg} \alpha + \operatorname{cotg} \alpha) = \operatorname{cosec} \alpha$$

$$\cos \alpha \left( \frac{\operatorname{sen} \alpha}{\cos \alpha} + \frac{\cos \alpha}{\operatorname{sen} \alpha} \right) = \cos \alpha \left( \frac{\operatorname{sen}^2 \alpha + \cos^2 \alpha}{\cos \alpha \operatorname{sen} \alpha} \right) =$$

$$= \cos \alpha \frac{1}{\cos \alpha \operatorname{sen} \alpha} = \frac{1}{\operatorname{sen} \alpha} = \operatorname{cosec} \alpha$$

$$6.- \operatorname{sen} \alpha (\operatorname{cotg} \alpha + \operatorname{tg} \alpha) = \sec \alpha$$

$$\operatorname{sen} \alpha \left( \frac{\cos \alpha}{\operatorname{sen} \alpha} + \frac{\operatorname{sen} \alpha}{\cos \alpha} \right) = \operatorname{sen} \alpha \left( \frac{\cos^2 \alpha + \operatorname{sen}^2 \alpha}{\operatorname{sen} \alpha \cos \alpha} \right) =$$

$$= \operatorname{sen} \alpha \frac{1}{\operatorname{sen} \alpha \cos \alpha} = \frac{1}{\cos \alpha} = \sec \alpha$$

$$7.- \operatorname{tg} \alpha \cot \alpha - \cos^2 \alpha = \operatorname{sen}^2 \alpha$$

$$\frac{\operatorname{sen} \alpha}{\cos \alpha} \cdot \frac{\cos \alpha}{\operatorname{sen} \alpha} - \cos^2 \alpha = 1 - \cos^2 \alpha = \operatorname{sen}^2 \alpha$$

$$8.- \operatorname{sen} \alpha \operatorname{cosec} \alpha - \cos^2 \alpha = \operatorname{sen}^2 \alpha$$

$$\operatorname{sen} \alpha \frac{1}{\operatorname{sen} \alpha} - \cos^2 \alpha = 1 - \cos^2 \alpha = \operatorname{sen}^2 \alpha$$

$$10.- (\operatorname{cosec} \alpha - 1) (\operatorname{cosec} \alpha + 1) = \operatorname{tg}^2 \alpha$$

$$\operatorname{cosec}^2 \alpha - 1 = \frac{1}{\operatorname{sen}^2 \alpha} - 1 = \frac{1 - \operatorname{sen}^2 \alpha}{\operatorname{sen}^2 \alpha} = \frac{\cos^2 \alpha}{\operatorname{sen}^2 \alpha} = \operatorname{cotg}^2 \alpha$$

$$12.- (\operatorname{cosec} \alpha + \operatorname{cotg} \alpha) (\operatorname{cosec} \alpha - \operatorname{cotg} \alpha) = 1$$

$$\operatorname{cosec}^2 \alpha - \operatorname{cotg}^2 \alpha = \frac{1}{\operatorname{sen}^2 \alpha} - \frac{\cos^2 \alpha}{\operatorname{sen}^2 \alpha} = \frac{1 - \cos^2 \alpha}{\operatorname{sen}^2 \alpha} = \frac{\operatorname{sen}^2 \alpha}{\operatorname{sen}^2 \alpha} = 1$$