

Identidades trigonométricas

Elaborado por el Profesor José Antonio Prieto

$$(1) \sin^2(\alpha) + \cos^2(\alpha) = 1$$

$$(2) \operatorname{tg}^2(\alpha) + 1 = \sec^2(\alpha)$$

$$(3) 1 + \operatorname{ctg}^2(\alpha) = \operatorname{csc}^2(\alpha)$$

$$(4) \sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \sin(\beta) \cos(\alpha)$$

$$(5) \cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$$

$$(6) \operatorname{tg}(\alpha \pm \beta) = \frac{\operatorname{tg}(\alpha) \pm \operatorname{tg}(\beta)}{1 \mp \operatorname{tg}(\alpha) \operatorname{tg}(\beta)}$$

$$(7) \sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$$

$$(8) \cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$$

$$(9) \operatorname{tg}(2\alpha) = \frac{2 \operatorname{tg}(\alpha)}{1 - \operatorname{tg}^2(\alpha)}$$

$$(10) \sin^2(\alpha) = \frac{1 - \cos(2\alpha)}{2}$$

$$(11) \cos^2(\alpha) = \frac{1 + \cos(2\alpha)}{2}$$

$$(12) \sin\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1 - \cos(\alpha)}{2}}$$

$$(13) \cos\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1 + \cos(\alpha)}{2}}$$

$$(14) \operatorname{tg}\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1 - \cos(\alpha)}{1 + \cos(\alpha)}}$$

$$(15) \sin(\alpha) \cos(\beta) = \frac{1}{2}[\sin(\alpha + \beta) + \sin(\alpha - \beta)]$$

$$(16) \sin(\alpha) \sin(\beta) = \frac{1}{2}[\cos(\alpha - \beta) - \cos(\alpha + \beta)]$$

$$(17) \cos(\alpha) \cos(\beta) = \frac{1}{2}[\cos(\alpha + \beta) + \cos(\alpha - \beta)]$$

$$(18) \sin(\alpha) + \sin(\beta) = 2 \cos\left(\frac{\alpha - \beta}{2}\right) \sin\left(\frac{\alpha + \beta}{2}\right)$$

$$(19) \sin(\alpha) - \sin(\beta) = 2 \cos\left(\frac{\alpha + \beta}{2}\right) \sin\left(\frac{\alpha - \beta}{2}\right)$$

$$(20) \cos(\alpha) + \cos(\beta) = 2 \cos\left(\frac{\alpha + \beta}{2}\right) \cos\left(\frac{\alpha - \beta}{2}\right)$$

$$(21) \cos(\alpha) - \cos(\beta) = -2 \sin\left(\frac{\alpha + \beta}{2}\right) \sin\left(\frac{\alpha - \beta}{2}\right)$$

$$(22) \operatorname{tg}(\alpha) + \operatorname{tg}(\beta) = \frac{\sin(\alpha + \beta)}{\cos(\alpha) \cos(\beta)}$$

$$(23) \operatorname{tg}(\alpha) - \operatorname{tg}(\beta) = \frac{\sin(\alpha - \beta)}{\cos(\alpha) \cos(\beta)}$$