TRIGONOMETRÍA

FÓRMULAS BÁSICAS

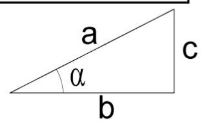
$$\mathrm{sen}\,\alpha = \frac{c}{a} \qquad \mathrm{cosec}\,\alpha = \frac{1}{\mathrm{sen}\,\alpha} = \frac{a}{c}$$

$$\cos\alpha = \frac{b}{a} \qquad \sec\alpha = \frac{1}{\cos\alpha} = \frac{a}{b}$$

$$\tan\alpha = \frac{\mathrm{sen}\,\alpha}{\cos\alpha} = \frac{c}{b} \qquad \mathrm{cotan}\,\alpha = \frac{1}{\tan\alpha} = \frac{b}{c}$$

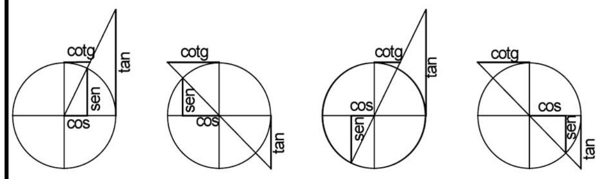
$$\mathrm{sen}^2\,\alpha + \cos^2\alpha = 1 \qquad \tan\alpha \times \mathrm{cotan}\,\alpha = 1$$

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



$$1 + \mathrm{cotan}^2\,\alpha = \frac{1}{\mathrm{sen}^2\,\alpha} = \mathrm{cosec}^2\,\alpha$$

LINEAS TRIGONOMÉTRICAS



Primer Cuadrante · Segundo Cuadrante · Tercer Cuadrante · Cuarto Cuadrante

REDUCCION AL 1er CUADRANTE

Ángulos complementarios:
Su suma vale π/2 radianes (90º)

sen (π/2 − α) = cos α
cos (π/2 − α) = sen α
tan (π/2 − α) = ctg α

Ángulos suplementarios:
Su suma vale π radianes (180º)

sen (π − α) = sen α
cos (π − α) = − cos α
tan (π − α) = − tan α

Ángulos que difieren en π/2 radianes:

sen (π/2 + α) = cos α
cos (π/2 + α) = − sen α
tan (π/2 + α) = − ctg α

Ángulos que se diferencian π radianes:

sen (π + α) = − sen α
cos (π + α) = − cos α
tan (π + α) = tan α

Ángulos opuestos:

sen (− α) = − sen(α)
cos (− α) = cos α
tan (− α) = − tan α

DETERMINACION DE UNA RAZON EN FUNCION DE OTRA

En función del seno:

$$\mathrm{cosec}\,\alpha = \frac{1}{\mathrm{sen}\,\alpha} \qquad \cos\alpha = \sqrt{1-\mathrm{sen}^2\,\alpha}$$

$$\sec\alpha = \frac{1}{\sqrt{1-\mathrm{sen}^2\,\alpha}} \qquad \tan\alpha = \frac{\mathrm{sen}\,\alpha}{\sqrt{1-\mathrm{sen}^2\,\alpha}}$$

$$\mathrm{ctg}\,\alpha = \frac{\sqrt{1-\mathrm{sen}^2\,\alpha}}{\mathrm{sen}\,\alpha}$$

En función del coseno:

$$\mathrm{sen}\,\alpha = \sqrt{1-\cos^2\alpha}$$

$$\sec\alpha = \frac{1}{\cos\alpha} \qquad \mathrm{cosec}\,\alpha = \frac{1}{\sqrt{1-\cos^2\alpha}}$$

$$\tan\alpha = \frac{\sqrt{1-\cos^2\alpha}}{\cos\alpha} \qquad \mathrm{ctg}\,\alpha = \frac{\cos\alpha}{\sqrt{1-\cos^2\alpha}}$$

En función de la tangente:

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

$$\mathrm{ctg}\,\alpha = \frac{1}{\tan\alpha} \qquad \sec\alpha = \sqrt{1+\tan^2\alpha}$$

$$\mathrm{cosec}\,\alpha = \frac{\sqrt{1+\tan^2\alpha}}{\tan\alpha} \qquad \mathrm{sen}\,\alpha = \frac{\tan\alpha}{\sqrt{1+\tan^2\alpha}}$$

En función de la tangente del ángulo mitad

(Usadas para integrar)

$$\mathrm{sen}\,\alpha = \frac{2\tan(\alpha/2)}{1+\tan^2(\alpha/2)} \qquad \mathrm{sen}\,2\alpha = \frac{2\tan\alpha}{1+\tan^2\alpha}$$

$$\cos\alpha = \frac{1-\tan^2(\alpha/2)}{1+\tan^2(\alpha/2)} \qquad \cos 2\alpha = \frac{1-\tan^2\alpha}{1+\tan^2\alpha}$$

$$\tan\alpha = \frac{2\tan(\alpha/2)}{1-\tan^2(\alpha/2)} \qquad \tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha}$$

En función del coseno del ángulo doble:

(Usadas para integrar)

$$\mathrm{sen}\,\alpha = \sqrt{\frac{1-\cos 2\alpha}{2}} \qquad \mathrm{sen}\,\frac{\alpha}{2} = \sqrt{\frac{1-\cos\alpha}{2}}$$

$$\cos\alpha = \sqrt{\frac{1+\cos 2\alpha}{2}} \qquad \cos\frac{\alpha}{2} = \sqrt{\frac{1+\cos\alpha}{2}}$$

$$\tan\alpha = \sqrt{\frac{1-\cos 2\alpha}{1+\cos 2\alpha}} \qquad \tan\frac{\alpha}{2} = \sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$$

RAZONES DEL ÁNGULO SUMA/DIFERENCIA

$$\mathrm{sen}(\alpha \pm \beta) = \mathrm{sen}\,\alpha\cos\beta \pm \cos\alpha\,\mathrm{sen}\,\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \;\mathrm{m}\,\mathrm{sen}\,\alpha\,\mathrm{sen}\,\beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1\,\mathrm{m}\tan\alpha\tan\beta} \qquad \frac{\mathrm{sen}\,\alpha + \mathrm{sen}\,\beta}{\mathrm{sen}\,\alpha - \mathrm{sen}\,\beta} = \frac{\tan\frac{1}{2}(\alpha+\beta)}{\tan\frac{1}{2}(\alpha-\beta)}$$

$$\mathrm{ctg}(\alpha \pm \beta) = \frac{\mathrm{ctg}\,\alpha\;\mathrm{ctg}\,\beta\;\mathrm{m1}}{\mathrm{ctg}\,\alpha \pm \mathrm{ctg}\,\beta} \qquad \frac{\cos s\alpha + \cos\beta}{\cos\alpha - \cos\beta} = -\frac{\alpha+\beta}{2}\,\mathrm{cotan}\,\frac{\alpha-\beta}{2}$$

TRANSFORMACION DE SUMAS A PRODUCTOS Y VICEVERSA

(Estas expresiones se utilizan en la resolución de triángulos con el empleo de logaritmos)

SUMAS a PRODUCTOS

$$\mathrm{sen}\,\alpha + \mathrm{sen}\,\beta = 2\,\mathrm{sen}\,\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \qquad \mathrm{sen}\,\alpha - \mathrm{sen}\,\beta = 2\cos\frac{\alpha+\beta}{2}\,\mathrm{sen}\,\frac{\alpha-\beta}{2}$$

$$\cos\alpha + \cos\beta = 2\cos\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \qquad \cos\alpha - \cos\beta = -2\,\mathrm{sen}\,\frac{\alpha+\beta}{2}\,\mathrm{sen}\,\frac{\alpha-\beta}{2}$$

$$\tan\alpha + \tan\beta = \frac{\mathrm{sen}(\alpha+\beta)}{\cos\alpha\cos\beta}$$

$$\tan\alpha - \tan\beta = \frac{\mathrm{sen}(\alpha-\beta)}{\cos\alpha\cos\beta}$$

$$\mathrm{ctg}\,\alpha + \mathrm{ctg}\,\beta = \frac{\mathrm{sen}(\alpha+\beta)}{\mathrm{sen}\,\alpha\,\mathrm{sen}\,\beta}$$

$$\mathrm{ctg}\,\alpha - \mathrm{ctg}\,\beta = \frac{\mathrm{sen}(\beta-\alpha)}{\mathrm{sen}\,\alpha\,\mathrm{sen}\,\beta}$$

PRODUCTOS a SUMAS

$$\mathrm{sen}\,\alpha\;\mathrm{sen}\,\beta = \frac{1}{2}\left[\cos(\alpha-\beta) - \cos(\alpha+\beta)\right]$$

$$\mathrm{sen}\,\alpha\;\cos\beta = \frac{1}{2}\left[\mathrm{sen}(\alpha+\beta) + \mathrm{sen}(\alpha-\beta)\right]$$

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