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TALLER 14 ASIGNATURA: MATEMATICA GRADO: DECIMO GRUPOS 01 Y 02

### Razones trigonométricas de la suma y diferencia de ángulos

1.  $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$
2.  $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$
3.  $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$
4.  $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$
5.  $\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$
6.  $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$

$$\begin{aligned}\sin 15^\circ &= \sin(45^\circ - 30^\circ) \\ &= \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ \\ &= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ &= \frac{\sqrt{2}}{4}(\sqrt{3} - 1)\end{aligned}$$

### Razones trigonométricas del ángulo doble

1.  $\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$
2.  $\cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$
3.  $\tan(2\alpha) = \frac{2 \tan(\alpha)}{1 - \tan^2(\alpha)}$

$$\begin{aligned}\cos 120^\circ &= \cos^2 60^\circ - \sin^2 60^\circ \\ &= \left(\frac{1}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 \\ &= \frac{1}{4} - \frac{3}{4} \\ &= -\frac{2}{4}\end{aligned}$$

### Razones trigonométricas del ángulo mitad

1.  $\sin\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 - \cos(\alpha)}{2}}$
2.  $\cos\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 + \cos(\alpha)}{2}}$
3.  $\tan\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 - \cos(\alpha)}{1 + \cos(\alpha)}}$

$$\begin{aligned}\sin(22^\circ 30') &= \sin\left(\frac{45^\circ}{2}\right) \\ &= \sqrt{\frac{1 - \cos 45^\circ}{2}} \\ &= \sqrt{\frac{1 - \frac{\sqrt{2}}{2}}{2}} \\ &= \sqrt{\frac{2 - \sqrt{2}}{2}} \\ &= \sqrt{\frac{2 - \sqrt{2}}{4}} \\ &= \frac{\sqrt{2 - \sqrt{2}}}{2}\end{aligned}$$