

# FORMULE DI DUPLICAZIONE E BISEZIONE



M4011

CALCOLIAMO CON UN ESERCIZIO

$$\text{Sen}(\alpha + \alpha) = \text{Sen} \alpha \cos \alpha + \text{Sen} \alpha \cos \alpha$$

$$2 \text{ Sen} \alpha \cos \alpha \rightarrow \text{Sen } 2\alpha = 2 \text{ Sen} \alpha \cos \alpha$$

$(\alpha + \alpha)$

$$\text{Sen } 2\alpha = 2 \text{ Sen} \alpha \cos \alpha$$

DUPLICAZIONE DEL SENO

**! VIETATO**  $\triangle$

$$\frac{\text{Sen } 2\alpha}{2}$$

$$\cos 2\alpha = \cos(\alpha + \alpha) = \cos \alpha \cos \alpha - \text{Sen} \alpha \text{ Sen} \alpha = \cos^2 \alpha - \text{Sen}^2 \alpha$$

$$\cos 2\alpha = \cos^2 \alpha - \text{Sen}^2 \alpha$$

DUPLICAZIONE DEL COSENO

$$\begin{aligned} \cos 2\alpha & \left\{ \begin{aligned} \cos^2 \alpha - (1 - \cos^2 \alpha) &= 2\cos^2 \alpha - 1 \\ (1 - \text{Sen}^2 \alpha) - \text{Sen}^2 \alpha &= 1 - 2\text{Sen}^2 \alpha \end{aligned} \right. \end{aligned}$$

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

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

DUPLICAZIONE TANGENTE

A PARTIRE DA  $\cos 2\alpha = 1 - 2 \sin^2 \alpha$  MA  $\alpha = 2 \left( \frac{\alpha}{2} \right)$

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

$$+ 2 \sin^2 \frac{\alpha}{2} = 1 - \cos \alpha$$

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

$$\sin \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$$

BISEZIONE DEL SENO

A PARTIRE DA  $\cos 2\alpha = 2\cos^2 \alpha - 1$   $\alpha = 2 \cdot \frac{\alpha}{2}$

$$\cos \alpha = 2 \cos^2 \frac{\alpha}{2} - 1 \rightarrow 2 \cos^2 \frac{\alpha}{2} = 1 + \cos \alpha$$

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

$\rightarrow$

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

BISEZIONE DEL COSENO

$$\operatorname{tg} \frac{\alpha}{2} = \frac{\operatorname{Sen} \frac{\alpha}{2}}{\cos \frac{\alpha}{2}} = \frac{\pm \sqrt{\frac{1 - \cos \alpha}{2}}}{\pm \sqrt{\frac{1 + \cos \alpha}{2}}} = \pm \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}}$$

BISEZIONE TANGENTE

