

RELAZIONI GONIOMETRICHE

Relazioni fondamentali

$\sin^2 \alpha + \cos^2 \alpha = 1$	$\operatorname{tg} \alpha = \frac{\sin \alpha}{\cos \alpha}$	$\operatorname{cotg} \alpha = \frac{\cos \alpha}{\sin \alpha}$	$\sec \alpha = \frac{1}{\cos \alpha}$	$\operatorname{cosec} \alpha = \frac{1}{\sin \alpha}$
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Relazioni tra le funzioni goniometriche

	$\sin \alpha$	$\cos \alpha$	$\operatorname{tg} \alpha$	$\operatorname{cotg} \alpha$
$\sin \alpha$	$\sin \alpha$	$\pm \sqrt{1 - \cos^2 \alpha}$	$\pm \frac{\operatorname{tg} \alpha}{\sqrt{1 + \operatorname{tg}^2 \alpha}}$	$\pm \frac{1}{\sqrt{1 + \operatorname{cotg}^2 \alpha}}$
$\cos \alpha$	$\pm \sqrt{1 - \sin^2 \alpha}$	$\cos \alpha$	$\pm \frac{1}{\sqrt{1 + \operatorname{tg}^2 \alpha}}$	$\pm \frac{\operatorname{cotg} \alpha}{\sqrt{1 + \operatorname{cotg}^2 \alpha}}$
$\operatorname{tg} \alpha$	$\pm \frac{\sin \alpha}{\sqrt{1 - \sin^2 \alpha}}$	$\pm \frac{\sqrt{1 - \cos^2 \alpha}}{\cos \alpha}$	$\operatorname{tg} \alpha$	$\frac{1}{\operatorname{cotg} \alpha}$
$\operatorname{cotg} \alpha$	$\pm \frac{\sqrt{1 - \sin^2 \alpha}}{\sin \alpha}$	$\pm \frac{\cos \alpha}{\sqrt{1 - \cos^2 \alpha}}$	$\frac{1}{\operatorname{tg} \alpha}$	$\operatorname{cotg} \alpha$

Archi Associati

Archi Supplementari	Archi che differiscono di π	Archi opposti	Archi esplementari
$\sin(\pi - x) = \sin x$	$\sin(\pi + x) = -\sin x$	$\sin(-x) = -\sin x$	$\sin(2\pi - x) = -\sin x$
$\cos(\pi - x) = -\cos x$	$\cos(\pi + x) = -\cos x$	$\cos(-x) = \cos x$	$\cos(2\pi - x) = \cos x$
$\operatorname{tg}(\pi - x) = -\operatorname{tg} x$	$\operatorname{tg}(\pi + x) = \operatorname{tg} x$	$\operatorname{tg}(-x) = -\operatorname{tg} x$	$\operatorname{tg}(2\pi - x) = -\operatorname{tg} x$
$\operatorname{cotg}(\pi - x) = -\operatorname{cotg} x$	$\operatorname{cotg}(\pi + x) = \operatorname{cotg} x$	$\operatorname{cotg}(-x) = -\operatorname{cotg} x$	$\operatorname{cotg}(2\pi - x) = -\operatorname{cotg} x$
Archi complementari	Archi che differiscono di $\pi/2$	Archi la cui somma è $3\pi/2$	Archi che differiscono di $3\pi/2$
$\sin(\pi/2 - x) = \cos x$	$\sin(\pi/2 + x) = \cos x$	$\sin(3\pi/2 - x) = -\cos x$	$\sin(3\pi/2 + x) = -\cos x$
$\cos(\pi/2 - x) = \sin x$	$\cos(\pi/2 + x) = -\sin x$	$\cos(3\pi/2 - x) = -\sin x$	$\cos(3\pi/2 + x) = \sin x$
$\operatorname{tg}(\pi/2 - x) = \operatorname{cotg} x$	$\operatorname{tg}(\pi/2 + x) = -\operatorname{cotg} x$	$\operatorname{tg}(3\pi/2 - x) = \operatorname{cotg} x$	$\operatorname{tg}(3\pi/2 + x) = -\operatorname{cotg} x$
$\operatorname{cotg}(\pi/2 - x) = \operatorname{tg} x$	$\operatorname{cotg}(\pi/2 + x) = -\operatorname{tg} x$	$\operatorname{cotg}(3\pi/2 - x) = \operatorname{tg} x$	$\operatorname{cotg}(3\pi/2 + x) = -\operatorname{tg} x$

Formule di Addizione e Sottrazione

$\sin(\alpha \pm \beta) = \sin \alpha \cdot \cos \beta \pm \cos \alpha \cdot \sin \beta$	$\cos(\alpha \pm \beta) = \cos \alpha \cdot \cos \beta \mp \sin \alpha \cdot \sin \beta$
$\operatorname{tg}(\alpha \pm \beta) = \frac{\operatorname{tg} \alpha \pm \operatorname{tg} \beta}{1 \mp \operatorname{tg} \alpha \cdot \operatorname{tg} \beta}$	$\operatorname{cotg}(\alpha \pm \beta) = \frac{\operatorname{cotg} \beta \cdot \operatorname{cotg} \alpha \mp 1}{\operatorname{cotg} \beta \pm \operatorname{cotg} \alpha}$

Formule di Duplicazione

$\sin(2\alpha) = 2 \sin \alpha \cdot \cos \alpha$	$\cos(2\alpha) = \cos^2 \alpha - \sin^2 \alpha = 1 - 2 \sin^2 \alpha = 2 \cos^2 \alpha - 1$
$\operatorname{tg}(2\alpha) = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}$	$\operatorname{cotg}(2\alpha) = \frac{\operatorname{cotg}^2 \alpha - 1}{2 \operatorname{cotg} \alpha}$

Formule di Bisezione

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

Formule di Prostaferesi

$\sin p + \sin q = 2 \sin\left(\frac{p+q}{2}\right) \cos\left(\frac{p-q}{2}\right)$	$\cos p + \cos q = 2 \cos\left(\frac{p+q}{2}\right) \cos\left(\frac{p-q}{2}\right)$
$\sin p - \sin q = 2 \sin\left(\frac{p-q}{2}\right) \cos\left(\frac{p+q}{2}\right)$	$\cos p - \cos q = -2 \sin\left(\frac{p+q}{2}\right) \sin\left(\frac{p-q}{2}\right)$

Formule di Werner

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

Formule Parametriche (con $t = \operatorname{tg} \frac{\alpha}{2}$)

$\sin \alpha = \frac{2t}{1+t^2}$	$\cos \alpha = \frac{1-t^2}{1+t^2}$	$\operatorname{tg} \alpha = \frac{2t}{1-t^2}$	$\operatorname{cotg} \alpha = \frac{1-t^2}{2t}$
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