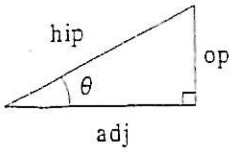
TRIGONOMETRIA

FUNÇÕES TRIGONOMÉTRICAS DE ÂNGULOS AGUDOS

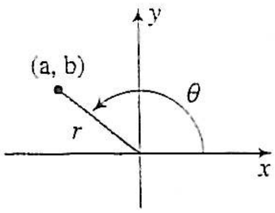


$$\operatorname{sen}\theta = \frac{\text{op}}{\text{hip}} \qquad \csc\theta = \frac{\text{hip}}{\text{op}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hip}} \qquad \sec\theta = \frac{\text{hip}}{\text{adj}}$$

$$\operatorname{tg}\theta = \frac{\text{op}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{op}}$$

DE ÂNGULOS ARBITRÁRIOS

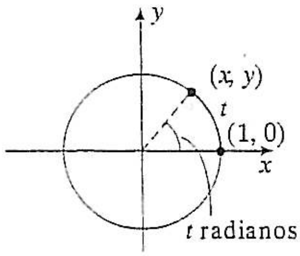


$$\operatorname{sen}\theta = \frac{b}{r} \qquad \csc\theta = \frac{r}{b}$$

$$\cos\theta = \frac{a}{r} \qquad \sec\theta = \frac{r}{a}$$

$$\operatorname{tg}\theta = \frac{b}{a} \qquad \cot\theta = \frac{a}{b}$$

DE NÚMEROS REAIS

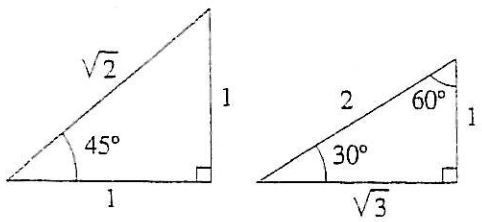


$$\operatorname{sen} t = y \qquad \csc t = \frac{1}{y}$$

$$\cos t = x \qquad \sec t = \frac{1}{x}$$

$$\operatorname{tg} t = \frac{y}{x} \qquad \cot t = \frac{x}{y}$$

TRIÂNGULOS ESPECIAIS



IDENTIDADES TRIGONOMÉTRICAS

$$\csc t = \frac{1}{\operatorname{sen} t} \qquad \operatorname{tg} t = \frac{\operatorname{sen} t}{\cos t}$$

$$\sec t = \frac{1}{\cos t} \qquad \cot t = \frac{\cos t}{\operatorname{sen} t}$$

$$\cot t = \frac{1}{\operatorname{tg} t}$$

$$\operatorname{sen}^2 t + \cos^2 t = 1 \qquad \operatorname{sen}(-t) = -\operatorname{sen} t$$

$$1 + \operatorname{tg}^2 t = \sec^2 t \qquad \cos(-t) = \cos t$$

$$1 + \cot^2 t = \csc^2 t \qquad \operatorname{tg}(-t) = -\operatorname{tg} t$$

$$\operatorname{sen}(u + v) = \operatorname{sen} u \cos v + \cos u \operatorname{sen} v$$

$$\cos(u + v) = \cos u \cos v - \operatorname{sen} u \operatorname{sen} v$$

$$\operatorname{tg}(u + v) = \frac{\operatorname{tg} u + \operatorname{tg} v}{1 - \operatorname{tg} u \operatorname{tg} v}$$

$$\operatorname{sen}(u - v) = \operatorname{sen} u \cos v - \cos u \operatorname{sen} v$$

$$\cos(u - v) = \cos u \cos v + \operatorname{sen} u \operatorname{sen} v$$

$$\operatorname{tg}(u - v) = \frac{\operatorname{tg} u - \operatorname{tg} v}{1 + \operatorname{tg} u \operatorname{tg} v}$$

$$\operatorname{sen} 2u = 2 \operatorname{sen} u \cos u$$

$$\cos 2u = \cos^2 u - \operatorname{sen}^2 u = 1 - 2\operatorname{sen}^2 u = 2\cos^2 u - 1$$

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

$$\left|\operatorname{sen}\frac{u}{2}\right| = \sqrt{\frac{1 - \cos u}{2}} \qquad \left|\cos\frac{u}{2}\right| = \sqrt{\frac{1 + \cos u}{2}}$$

$$\operatorname{tg}\frac{u}{2} = \frac{1 - \cos u}{\operatorname{sen} u} = \frac{\operatorname{sen} u}{1 + \cos u}$$

$$\operatorname{sen}^2 u = \frac{1 - \cos 2u}{2} \qquad \cos^2 u = \frac{1 + \cos 2u}{2}$$

$$\operatorname{sen} u \cos v = \tfrac{1}{2}[\operatorname{sen}(u + v) + \operatorname{sen}(u - v)]$$

$$\cos u \operatorname{sen} v = \tfrac{1}{2}[\operatorname{sen}(u + v) - \operatorname{sen}(u - v)]$$

$$\cos u \cos v = \tfrac{1}{2}[\cos(u + v) + \cos(u - v)]$$

$$\operatorname{sen} u \operatorname{sen} v = \tfrac{1}{2}[\cos(u - v) - \cos(u + v)]$$

VALORES ESPECIAIS DE FUNÇÕES TRIGONOMÉTRICAS

θ (graus)	θ (radianos)	sen θ	cos θ	tg θ	cot θ	sec θ	csc θ
0°	0	0	1	0	–	1	–
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
90°	$\frac{\pi}{2}$	1	0	–	0	–	1

EXPOENTES E RADICAIS

$a^m a^n = a^{m+n}$ $\qquad$ $a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$

$(a^m)^n = a^{mn}$ $\qquad$ $\sqrt[n]{ab} = \sqrt[n]{a}\,\sqrt[n]{b}$

$(ab)^n = a^n b^n$ $\qquad$ $\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ $\qquad$ $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

$\dfrac{a^m}{a^n} = a^{m-n}$ $\qquad$ $a^{-n} = \dfrac{1}{a^n}$

VALOR ABSOLUTO ($d > 0$)

$|x| < d$ se e só se $-d < x < d$

$|x| > d$ se e só se $x > d$ ou $x < -d$

$|a+b| \leq |a| + |b|$ (desigualdade do triângulo)

$-|a| \leq a \leq |a|$

DESIGUALDADES

Se $a > b$ e $b > c$, então $a > c$

Se $a > b$, então $a + c > b + c$

Se $a > b$ e $c > 0$, então $ac > bc$

Se $a > b$ e $c < 0$, então $ac < bc$

FÓRMULA QUADRÁTICA

Se $a \neq 0$, as raízes de $ax^2 + bx + c = 0$ são

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

LOGARITMOS

$y = \log_a x$ significa $a^y = x$ $\qquad$ $\log_a 1 = 0$

$\log_a xy = \log_a x + \log_a y$ $\qquad$ $\log_a a = 1$

$\log_a \dfrac{x}{y} = \log_a x - \log_a y$ $\qquad$ $\log x = \log_{10} x$

$\log_a x^r = r \log_a x$ $\qquad$ $\ln x = \log_e x$

TEOREMA BINOMIAL

$$(x+y)^n = x^n + \binom{n}{1} x^{n-1} y + \binom{n}{2} x^{n-2} y^2 + \ldots + \binom{n}{k} x^{n-k} y^k + \ldots + y^n,$$

onde $\dbinom{n}{k} = \dfrac{n!}{k!\,(n-k)!}$