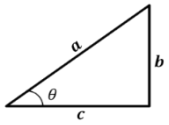
TRIGONOMETRIA BÁSICA

Razões trigonométricas

$\sin\theta = \frac{b}{a}$ $\cos\theta = \frac{c}{a}$ $\tan\theta = \frac{b}{c}$



Principais identidades

$$\text{sen}^2\,\theta + \cos^2\theta = 1 \qquad 1 + \tan^2\theta = \sec^2\theta$$

$$1 + \cot^2\theta = \csc^2\theta$$

$$\cot\theta = \frac{1}{\tan\theta} \qquad \sec\theta = \frac{1}{\cos\theta} \qquad \csc\theta = \frac{1}{\sin\theta}$$

Arcos notáveis

	30^o ou $\pi/6$	45^o ou $\pi/4$	60^o ou $\pi/3$
Seno	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$
Cosseno	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$
Tangente	$\sqrt{3}/3$	1	$\sqrt{3}$

Soma/diferença de arcos

$$\sin(\theta_1 \pm \theta_2) = \sin\theta_1\cos\theta_2 \pm \sin\theta_2\cos\theta_1$$

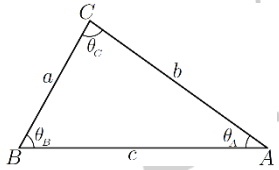
$$\cos(\theta_1 \pm \theta_2) = \cos\theta_1\cos\theta_2 \mp \sin\theta_1\sin\theta_2$$

$$\sin(2\theta) = 2\sin\theta\cos\theta \qquad \cos(2\theta) = \cos^2\theta - \sin^2\theta$$

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

Lei dos senos

$$\frac{a}{\sin\theta_A} = \frac{b}{\sin\theta_B} = \frac{c}{\sin\theta_C}$$



Lei dos cossenos

$$a^2 = b^2 + c^2 - 2bc\cos\theta_A$$

LOGARITMOS

$$\log_a b = x \Leftrightarrow a^x = b;\ \ (a > 0;\ \ a \neq 1;\ \ b > 0)$$

$$\log_a 1 = 0; \qquad \log_a a = 1; \qquad a^{\log_a b} = b; \qquad \log_a b = \frac{1}{\log_b a}$$

$$\log_a b = \frac{\log_c b}{\log_c a} \qquad \log_a b^\alpha = \alpha \cdot \log_a b \qquad \log_{a^\alpha} b = \frac{1}{\alpha}\cdot\log_a b$$

$$\log_a(b.c) = \log_a b + \log_a c \qquad \log_a\left(\frac{b}{c}\right) = \log_a b - \log_a c$$

MATEMÁTICA BÁSICA

Operações com frações

$$\frac{ab}{ac} = \frac{b}{c} \qquad \frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm bc}{bd} \qquad \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd} \qquad \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

Potenciação

$$a^m \cdot a^n = a^{m+n} \qquad \frac{a^m}{a^n} = a^{m-n} \qquad \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

$$\left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^m \qquad (a^m)^n = a^{m.n} \qquad (a \cdot b)^m = a^m \cdot b^m$$

Radiciação

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b} \qquad \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \qquad \sqrt[n]{a^m} = a^{\frac{m}{n}}$$

$$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m \qquad \sqrt[n]{a^m} \cdot \sqrt[q]{a^p} = \sqrt[nq]{a^{qm+pn}}$$

Fatoração e Produtos Notáveis

$$ax \pm ay = a(x \pm y)$$

$$ax + ay + bx + by = (a + b)(x + y)$$

$$a^2 - b^2 = (a + b)\,(a - b)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$a^n - b^n = (a - b)(a^{n-1} + a^{n-2}b + \cdots + ab^{n-2} + b^{n-1})$$

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

$$(a \pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$$

Fórmula de Bhaskara

$$ax^2 + bx + c = 0 \qquad \rightarrow \qquad x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Fatoração do trinômio do segundo grau com duas raízes

$$ax^2 + bx + c = a(x - x_1)(x - x_2)$$

Limites fundamentais

$$\lim_{x \to 0} \frac{\sin x}{x} = 1 \qquad \lim_{x \to +\infty} \left(1 + \frac{1}{x}\right)^x = e$$

$$\lim_{x \to 0} \frac{a^x - 1}{x} = \ln a \ \ (\text{onde } a > 0)$$

IFM
Instituto de Física e Matemática

PRE
Pró-reitoria de Ensino

FORMULÁRIO

GAMA
Grupo de Apoio em Matemática

PRINCIPAIS ATIVIDADES DO GAMA

Informações sobre Monitorias, Atividades de Reforço em Cálculo, Cursos Preparatórios para o Cálculo, Encontros de Cálculo, Encontros de ALGA e demais atividades do GAMA podem ser encontrados na página do Projeto:

http://wp.ufpel.edu.br/projetogama/

DERIVADAS

$Obs.: u = u(x), \quad v = v(x); \quad n, a \in \mathbb{R}$

1. $y = u^n \Rightarrow y' = n.u^{n-1}.u'$
2. $y = u \cdot v \Rightarrow y' = u' \cdot v + v' \cdot u$
3. $y = \frac{u}{v} \Rightarrow y' = \frac{u' \cdot v - v' \cdot u}{v^2}$
4. $y = a^u \Rightarrow y' = a^u \cdot (\ln a) \cdot u', (a > 0 \; e \; a \neq 1)$
5. $y = e^u \Rightarrow y' = e^u \cdot u'$
6. $y = \log_a u \Rightarrow y' = \frac{u'}{u \cdot \ln a}, (a > 0 \; e \; a \neq 1)$
7. $y = \ln u \Rightarrow y' = \frac{u'}{u}$
8. $y = u^v \Rightarrow y' = v \cdot u^{v-1} \cdot u' + u^v \cdot (\ln u) \cdot v'$
9. $y = \sin u \Rightarrow y' = u' \cdot \cos u$
10. $y = \cos u \Rightarrow y' = -u' \cdot \sin u$
11. $y = \tan u \Rightarrow y' = u' \cdot \sec^2 u$
12. $y = \cot u \Rightarrow y' = -u' \cdot \csc^2 u$
13. $y = \sec u \Rightarrow y' = u' \cdot \sec u \cdot \tan u$
14. $y = \csc u \Rightarrow y' = -u' \cdot \csc u \cdot \cot u$
15. $y = \text{arcsen}\, u \Rightarrow y' = \frac{u'}{\sqrt{1-u^2}}$
16. $y = \arccos u \Rightarrow y' = -\frac{u'}{\sqrt{1-u^2}}$
17. $y = \arctan u \Rightarrow y' = \frac{u'}{u^2+1}$
18. $y = \text{arccot}\, u \Rightarrow y' = -\frac{u'}{u^2+1}$
19. $y = \text{arcsec}\, u \Rightarrow y' = \frac{u'}{u.\sqrt{u^2-1}}$, tal que $|u| > 1$
20. $y = \text{arccsc}\, u \Rightarrow y' = -\frac{u'}{u.\sqrt{u^2-1}}$, tal que $|u| > 1$
21. $(u \circ v)'(x) = u'\big(v(x)\big) \cdot v'(x)$ (regra da cadeia)

SOMATÓRIOS

$\sum_{i=1}^{n} 1 = n$

$\sum_{i=1}^{n} i = \frac{n(n+1)}{2} \qquad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

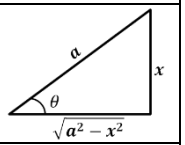
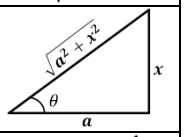
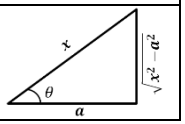
$\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4} \qquad \sum_{i=1}^{n} i^4 = \frac{n(n+1)(6n^3+9n^2+n-1)}{30}$

INTEGRAIS

$Obs.: u = u(x), v = v(x); \quad c, a, n \; constantes \; reais$

1. $\int du = u + c$
2. $\int a \cdot u \, dx = a \cdot \int u \, dx$
3. $\int (u \pm v) \, dx = \int u \, dx \pm \int v \, dx$
4. $\int u^n \, du = \frac{u^{n+1}}{n+1} + c \quad (n \neq -1)$
5. $\int \frac{du}{u} = \ln|u| + c$
6. $\int a^u \, du = \frac{a^u}{\ln a} + c \;\; (a > 0, a \neq 1)$
7. $\int e^u \, du = e^u + c$
8. $\int u \, dv = u.v - \int v \, du$ (int. por partes)
9. $\int \sin u \, du = -\cos u + c$
10. $\int \cos u \, du = \sin u + c$
11. $\int \tan u \, du = \ln|\sec u| + c$
12. $\int \cot u \, du = \ln|\sin u| + c$
13. $\int \sec u \, du = \ln|\sec u + \tan u| + c$
14. $\int \csc u \, du = \ln|\csc u - \cot u| + c$
15. $\int \sec u \cdot \tan u \, du = \sec u + c$
16. $\int \csc u \cdot \cot u \, du = -\csc u + c$
17. $\int \sec^2 u \, du = \tan u + c$
18. $\int \csc^2 u \, du = -\cot u + c$
19. $\int \frac{du}{u^2+a^2} = \frac{1}{a}\arctan\left(\frac{u}{a}\right) + c$
20. $\int \frac{du}{u^2-a^2} = \frac{1}{2a}\ln\left|\frac{u-a}{u+a}\right| + c \quad (u^2 > a^2)$
21. $\int \frac{du}{\sqrt{u^2+a^2}} = \ln\left|u + \sqrt{u^2+a^2}\right| + c$
22. $\int \frac{du}{\sqrt{u^2-a^2}} = \ln\left|u + \sqrt{u^2-a^2}\right| + c$
23. $\int \frac{du}{\sqrt{a^2-u^2}} = \text{arcsen}\left(\frac{u}{a}\right) + c \quad (u^2 < a^2)$
24. $\int \frac{du}{u.\sqrt{u^2-a^2}} = \frac{1}{a}\text{arcsec}\left|\frac{u}{a}\right| + c \quad (a \neq 0)$

SUBSTITUIÇÃO TRIGONOMÉTRICA

Para	Usamos	Para obter	Triângulo
Caso I $\sqrt{a^2-x^2}$	$x = a \cdot \sin(\theta)$	$a \cdot \cos(\theta)$	
Caso II $\sqrt{a^2+x^2}$	$x = a \cdot \tan(\theta)$	$a \cdot \sec(\theta)$	
Caso II $\sqrt{x^2-a^2}$	$x = a \cdot \sec(\theta)$	$a \cdot \tan(\theta)$	

TANGENTE DO ARCO METADE

$z = \tan\left(\frac{x}{2}\right) \quad \cos x = \frac{1-z^2}{1+z^2} \quad \sin x = \frac{2z}{1+z^2} \quad dx = \frac{2\,dz}{1+z^2}$