

Sejam  $u = f(x)$ ,  $v = g(x)$ ,  $u' = \frac{df(x)}{dx}$  e  $v' = \frac{dg(x)}{dx}$ . Sejam também  $a$ ,  $c$  e  $n$  constantes.

## Derivadas

### Regras Fundamentais

1.  $(au)' = au'$
2.  $(u + v)' = u' + v'$
3.  $(uv)' = u'v + uv'$
4.  $\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$
5.  $(u(v))' = u'(v) v'$  (Regra da Cadeia)

### Funções Básicas

Função	Derivada	Restrições
$a$	0	
$ax$	$a$	
$x^n$	$n x^{n-1}$	
$\frac{1}{x}$	$-\frac{1}{x^2}$	
$a^x$	$a^x \ln a$	$(a > 0, a \neq 1)$
$e^x$	$e^x$	
$\ln x$	$\frac{1}{x}$	

### Funções Genéricas

Função	Derivada	Restrições
$u^n$	$nu^{n-1}u'$	
$uv$	$u'v + v'u$	
$\frac{u}{v}$	$\frac{u'v - v'u}{v^2}$	
$a^u$	$a^u \ln a u'$	$(a > 0, a \neq 1)$
$e^u$	$e^u u'$	
$\log_a u$	$\frac{u'}{u} \log_a e = \frac{u'}{u} \cdot \frac{1}{\ln a}$	
$\ln u$	$\frac{1}{u} u'$	
$u^v$	$vu^{v-1}u' + u^v \ln u v'$	

### Funções Trigonômétricas

Função	Derivada
$\sin u$	$u' \cos u$
$\cos u$	$-u' \sin u$
$\tan u$	$u' \sec^2 u$
$\cot u$	$-u' \csc^2 u$
$\sec u$	$u' \sec u \cdot \tan u$
$\csc u$	$-u' \csc u \cdot \cot u$

### Funções Trigonômétricas Inversas

Função	Derivada	Restrições
$\arcsin u$	$\frac{u'}{\sqrt{1-u^2}}$	
$\arccos u$	$\frac{-u'}{\sqrt{1-u^2}}$	
$\arctan u$	$\frac{u'}{\sqrt{1+u^2}}$	
$\operatorname{arccotan} u$	$\frac{-u'}{\sqrt{1+u^2}}$	
$\operatorname{arcsec} u$	$\frac{u'}{ u \sqrt{u^2-1}}$	$ u  > 1$
$\operatorname{arccsc} u$	$\frac{-u'}{ u \sqrt{u^2-1}}$	$ u  > 1$

## Integrais

### Regras Fundamentais

1.  $\int a u \, dx = a \int u \, dx$
2.  $\int (u + v) \, dx = \int u \, dx + \int v \, dx$
3.  $\int u'v \, dx = uv - \int uv' \, dx$

### Funções Genéricas

Função	Integral	Restrições
$\int du$	$u + c$	
$\int u^n \, du$	$\frac{u^{n+1}}{n+1} + c$	$n \neq -1$
$\int \frac{1}{u} \, du$	$\ln  u  + c$	
$\int a^u \, du$	$\frac{a^u}{\ln a} + c$	$a > 0, a \neq 1$
$\int \ln x \, dx$	$x \ln x - x + c$	
$\int \log_a x \, dx$	$\frac{x}{\ln a} \log_a x - \frac{x}{\ln a} + c$	
$\int e^u \, du$	$e^u + c$	

### Funções Racionais

Função	Integral	Restrições
$\int \frac{1}{u^2+a^2} \, du$	$\frac{1}{a} \arctan \frac{u}{a} + c$	
$\int \frac{1}{u^2-a^2} \, du$	$\frac{1}{2a} \ln \left  \frac{u-a}{u+a} \right  + c$	$u^2 > a^2$
$\int \frac{1}{a^2-u^2} \, du$	$\frac{1}{2a} \ln \left  \frac{a+u}{a-u} \right  + c$	$u^2 < a^2$

### Funções Irracionais

Função	Integral	Restrições
$\int \frac{1}{\sqrt{u^2+a^2}} \, du$	$\ln  u + \sqrt{u^2+a^2}  + c$	
$\int \frac{1}{\sqrt{u^2-a^2}} \, du$	$\ln  u + \sqrt{u^2-a^2}  + c$	$u^2 > a^2$
$\int \frac{1}{\sqrt{a^2-u^2}} \, du$	$\arcsin \frac{u}{a} + c$	$u^2 < a^2$
$\int \frac{1}{u\sqrt{u^2-a^2}} \, du$	$\frac{1}{a} \operatorname{arcsec} \left  \frac{u}{a} \right  + c$	$u^2 > a^2$

### Funções Trigonômétricas

Função	Integral	Restrições
$\int \sin u \, du$	$-\cos u + c$	
$\int \cos u \, du$	$\sin u + c$	
$\int \tan u \, du$	$\ln  \sec u  + c$	
$\int \cot u \, du$	$\ln  \sin u  + c$	
$\int \sec u \, du$	$\ln  \sec u + \tan u  + c$	
$\int \csc u \, du$	$\ln  \csc u - \cot u  + c$	
$\int \sec u \cdot \tan u \, du$	$\sec u + c$	
$\int \csc u \cdot \cot u \, du$	$-\csc u + c$	
$\int \sin^2 u \, du$	$\frac{1}{2} (u - \sin u \cos u) + c$	
$\int \cos^2 u \, du$	$\frac{1}{2} (u + \sin u \cos u) + c$	
$\int \sec^2 u \, du$	$\tan u + c$	
$\int \csc^2 u \, du$	$-\cot u + c$	

## Definições e Identidades trigonométricas

1.  $\tan(x) = \frac{\sin x}{\cos x}$
2.  $\sin(-x) = -\sin(x)$
3.  $\cos(-x) = \cos(x)$
4.  $\tan(-x) = -\tan(x)$
5.  $\sin x = \cos(\frac{\pi}{2} - x)$
6.  $\cos x = \sin(\frac{\pi}{2} - x)$
7.  $\tan x = \cot(\frac{\pi}{2} - x)$
8.  $\cot x = \tan(\frac{\pi}{2} - x)$
9.  $\sec x = \csc(\frac{\pi}{2} - x)$
10.  $\csc x = \sec(\frac{\pi}{2} - x)$
11.  $\sec x = \frac{1}{\cos x}$
12.  $\cos x = \frac{1}{\sec x}$
13.  $\cot x = \frac{1}{\tan x}$
14.  $\sin^2 x + \cos^2 x = 1$
15.  $\sec^2 x - \tan^2 x = 1$
16.  $\csc^2 x - \cot^2 x = 1$
17.  $\sin 2x = 2 \sin x \cdot \cos x$
18.  $\cos 2x = \cos^2 x - \sin^2 x$
19.  $\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$
20.  $\tan \frac{x}{2} = \frac{1 - \cos x}{\sin x} = \frac{\sin x}{1 + \cos x}$
21.  $\sin(x \pm y) = \sin(x) \cos(y) \pm \sin(y) \cos(x)$
22.  $\cos(x \pm y) = \cos(x) \cos(y) \mp \sin(x) \sin(y)$
23.  $\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$
24.  $\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$
25.  $\cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$
26.  $2 \sin x \cos y = \sin(x - y) + \sin(x + y)$
27.  $2 \cos x \sin y = \sin(x + y) - \sin(x - y)$
28.  $2 \sin x \sin y = \cos(x - y) - \cos(x + y)$
29.  $2 \cos x \cos y = \cos(x - y) + \cos(x + y)$
30.  $1 + \cos x = 2 \cos^2 \frac{x}{2}$
31.  $1 - \cos x = 2 \sin^2 \frac{x}{2}$
32.  $\sin x + \sin y = 2 \sin(\frac{x+y}{2}) \cos(\frac{x-y}{2})$
33.  $\sin x - \sin y = 2 \cos(\frac{x+y}{2}) \sin(\frac{x-y}{2})$
34.  $\cos x + \cos y = 2 \cos(\frac{x+y}{2}) \cos(\frac{x-y}{2})$
35.  $\cos x - \cos y = -2 \sin(\frac{x+y}{2}) \sin(\frac{x-y}{2})$
36.  $\tan x + \tan y = \frac{\sin(x+y)}{\cos x \cos y}$