

UNIVERSIDADE FEDERAL DO ABC

Tabela de Derivadas, Integrais e Identidades Trigonômicas

Derivadas

Regras de Derivação

- $(cf(x))' = cf'(x)$

- Derivada da Soma

$$(f(x) + g(x))' = f'(x) + g'(x)$$

- Derivada do Produto

$$(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$$

- Derivada do Quociente

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$$

- Regra da Cadeia

$$(f(g(x)))' = (f'(g(x)))g'(x)$$

Funções Simples

- $\frac{d}{dx} c = 0$

- $\frac{d}{dx} x = 1$

- $\frac{d}{dx} cx = c$

- $\frac{d}{dx} x^c = cx^{c-1}$

- $\frac{d}{dx} \left(\frac{1}{x}\right) = \frac{d}{dx} (x^{-1}) = -x^{-2} = -\frac{1}{x^2}$

- $\frac{d}{dx} \left(\frac{1}{x^c}\right) = \frac{d}{dx} (x^{-c}) = -\frac{c}{x^{c+1}}$

- $\frac{d}{dx} \sqrt{x} = \frac{d}{dx} x^{\frac{1}{2}} = \frac{1}{2}x^{-\frac{1}{2}} = \frac{1}{2\sqrt{x}}$

Funções Exponenciais e Logarítmicas

- $\frac{d}{dx} e^x = e^x$

- $\frac{d}{dx} \ln(x) = \frac{1}{x}$

- $\frac{d}{dx} a^x = a^x \ln(a)$

Funções Trigonômicas

- $\frac{d}{dx} \sin x = \cos x$

- $\frac{d}{dx} \cos x = -\sin x$,

- $\frac{d}{dx} \operatorname{tg} x = \sec^2 x$

- $\frac{d}{dx} \sec x = \operatorname{tg} x \sec x$

- $\frac{d}{dx} \operatorname{cotg} x = -\operatorname{cosec}^2 x$

- $\frac{d}{dx} \operatorname{cosec} x = -\operatorname{cosec} x \operatorname{cotg} x$

Funções Trigonômicas Inversas

- $\frac{d}{dx} \operatorname{arcsen} x = \frac{1}{\sqrt{1-x^2}}$

- $\frac{d}{dx} \operatorname{arccos} x = \frac{-1}{\sqrt{1-x^2}}$

- $\frac{d}{dx} \operatorname{arctg} x = \frac{1}{1+x^2}$

- $\frac{d}{dx} \operatorname{arcsec} x = \frac{1}{|x|\sqrt{x^2-1}}$

- $\frac{d}{dx} \operatorname{arccotg} x = \frac{-1}{1+x^2}$

- $\frac{d}{dx} \operatorname{arccossec} x = \frac{-1}{|x|\sqrt{x^2-1}}$

Funções Hiperbólicas

- $\frac{d}{dx} \operatorname{senh} x = \operatorname{cosh} x = \frac{e^x + e^{-x}}{2}$

- $\frac{d}{dx} \operatorname{cosh} x = \operatorname{senh} x = \frac{e^x - e^{-x}}{2}$

- $\frac{d}{dx} \operatorname{tgh} x = \operatorname{sech}^2 x$

- $\frac{d}{dx} \operatorname{sech} x = -\operatorname{tgh} x \operatorname{sech} x$

- $\frac{d}{dx} \operatorname{cotgh} x = -\operatorname{cosech}^2 x$

Funções Hiperbólicas Inversas

- $\frac{d}{dx} \operatorname{csch} x = -\operatorname{coth} x \operatorname{cosech} x$

- $\frac{d}{dx} \operatorname{arcsenh} x = \frac{1}{\sqrt{x^2+1}}$

- $\frac{d}{dx} \operatorname{arccosh} x = \frac{1}{\sqrt{x^2-1}}$

- $\frac{d}{dx} \operatorname{arctgh} x = \frac{1}{1-x^2}$

- $\frac{d}{dx} \operatorname{arcsech} x = \frac{-1}{x\sqrt{1-x^2}}$

- $\frac{d}{dx} \operatorname{arccoth} x = \frac{1}{1-x^2}$

- $\frac{d}{dx} \operatorname{arccossech} x = \frac{-1}{|x|\sqrt{1+x^2}}$

Integrais

Regras de Integração

- $\int cf(x) dx = c \int f(x) dx$
- $\int [f(x) + g(x)] dx = \int f(x) dx + \int g(x) dx$
- $\int f'(x)g(x) dx = f(x)g(x) - \int f(x)g'(x) dx$

Funções Racionais

- $\int x^n dx = \frac{x^{n+1}}{n+1} + c$ para $n \neq -1$
- $\int \frac{1}{x} dx = \ln|x| + c$
- $\int \frac{du}{1+u^2} = \text{arctg } u + c$
- $\int \frac{1}{a^2+x^2} dx = \frac{1}{a} \text{arctg}(x/a) + c$
- $\int \frac{du}{1-u^2} = \begin{cases} \text{arctgh } u + c, & \text{se } |u| < 1 \\ \text{arccotgh } u + c, & \text{se } |u| > 1 \end{cases} = \frac{1}{2} \ln \left| \frac{1+u}{1-u} \right| + c$

Funções Logarítmicas

- $\int \ln x dx = x \ln x - x + c$
- $\int \log_a x dx = x \log_a x - \frac{x}{\ln a} + c$

Funções Irracionais

- $\int \frac{du}{\sqrt{1-u^2}} = \text{arcsen } u + c$
- $\int \frac{du}{u\sqrt{u^2-1}} = \text{arcsec } u + c$
- $\int \frac{du}{\sqrt{1+u^2}} = \text{arcsenh } u + c = \ln|u + \sqrt{u^2+1}| + c$
- $\int \frac{du}{\sqrt{1-u^2}} = \text{arccosh } u + c = \ln|u + \sqrt{u^2-1}| + c$
- $\int \frac{du}{u\sqrt{1-u^2}} = -\text{arcsech } |u| + c$

- $\int \frac{du}{u\sqrt{1+u^2}} = -\text{arccosech } |u| + c$
- $\int \frac{1}{\sqrt{a^2-x^2}} dx = \text{arcsen } \frac{x}{a} + c$
- $\int \frac{-1}{\sqrt{a^2-x^2}} dx = \text{arccos } \frac{x}{a} + c$

Funções Trigonômicas

- $\int \cos x dx = \text{sen } x + c$
- $\int \text{sen } x dx = -\cos x + c$
- $\int \text{tg } x dx = \ln|\sec x| + c$
- $\int \csc x dx = \ln|\csc x - \cot x| + c$
- $\int \sec x dx = \ln|\sec x + \text{tg } x| + c$
- $\int \cot x dx = \ln|\text{sen } x| + c$
- $\int \sec x \text{tg } x dx = \sec x + c$
- $\int \csc x \cot x dx = -\csc x + c$
- $\int \sec^2 x dx = \text{tg } x + c$
- $\int \csc^2 x dx = -\cot x + c$
- $\int \text{sen}^2 x dx = \frac{1}{2}(x - \text{sen } x \cos x) + c$
- $\int \cos^2 x dx = \frac{1}{2}(x + \text{sen } x \cos x) + c$

Funções Hiperbólicas

- $\int \sinh x dx = \cosh x + c$
- $\int \cosh x dx = \sinh x + c$
- $\int \text{tgh } x dx = \ln(\cosh x) + c$
- $\int \text{csch } x dx = \ln|\text{tgh } \frac{x}{2}| + c$
- $\int \text{sech } x dx = \text{arctg}(\sinh x) + c$
- $\int \text{coth } x dx = \ln|\sinh x| + c$

Identidades Trigonométricas

1. $\text{sen}(90^\circ - \theta) = \cos \theta$

2. $\cos(90^\circ - \theta) = \text{sen } \theta$

3. $\frac{\text{sen } \theta}{\cos \theta} = \text{tg } \theta$

4. $\text{sen}^2 \theta + \cos^2 \theta = 1$

5. $\sec^2 \theta - \text{tg}^2 \theta = 1$

6. $\csc^2 \theta - \cot^2 \theta = 1$

7. $\text{sen } 2\theta = 2 \text{sen } \theta \cos \theta$

8. $\cos 2\theta = \cos^2 \theta - \text{sen}^2 \theta = 2 \cos^2 \theta - 1$

9. $\text{sen } 2\theta = 2 \text{sen } \theta \cos \theta$

10. $\text{sen}(\alpha \pm \beta) = \text{sen } \alpha \cos \beta \pm \cos \alpha \text{sen } \beta$

11. $\cos(\alpha \pm \beta) = \cos \alpha \text{sen } \beta \pm \text{sen } \alpha \cos \beta$

12. $\text{tg}(\alpha \pm \beta) = \frac{\text{tg } \alpha \pm \text{tg } \beta}{1 \mp \text{tg } \alpha \text{tg } \beta}$

13. $\text{sen } \alpha \pm \text{sen } \beta = 2 \text{sen } \frac{1}{2}(\alpha \pm \beta) \cos \frac{1}{2}(\alpha \pm \beta)$

14. $\cos \alpha + \cos \beta = 2 \cos \frac{1}{2}(\alpha + \beta) \cos \frac{1}{2}(\alpha - \beta)$

15. $\cos \alpha - \cos \beta = 2 \text{sen } \frac{1}{2}(\alpha + \beta) \text{sen } \frac{1}{2}(\alpha - \beta)$