• *Derivadas*

Sejam u e v funções deriváveis de x e n constante.

1. $y = u^n \ \Rightarrow y' = n\,u^{n-1}u'.$
2. $y = uv \ \Rightarrow y' = u'v + v'u.$
3. $y = \frac{u}{v} \ \Rightarrow y' = \frac{u'v - v'u}{v^2}.$
4. $y = a^u \ \Rightarrow y' = a^u(\ln a)\,u', \ (a > 0, \ a \neq 1).$
5. $y = e^u \ \Rightarrow y' = e^u u'.$
6. $y = \log_a u \ \Rightarrow y' = \frac{u'}{u}\log_a e.$
7. $y = \ln u \ \Rightarrow y' = \frac{1}{u}u'.$
8. $y = u^v \ \Rightarrow y' = v\,u^{v-1}\,u' + u^v(\ln u)\,v'.$
9. $y = \text{sen}\ u \ \Rightarrow y' = u' \cos\ u.$
10. $y = \cos\ u \ \Rightarrow y' = -u'\text{sen}\ u.$
11. $y = \text{tg}\ u \ \Rightarrow y' = u' \sec^2 u.$
12. $y = \text{cotg}\ u \ \Rightarrow y' = -u'\text{cosec}^2 u.$
13. $y = \sec\ u \ \Rightarrow y' = u' \sec\ u\ \text{tg}\ u.$
14. $y = \text{cosec}\ u \ \Rightarrow y' = -u'\text{cosec}\ u\ \text{cotg}\ u.$
15. $y = arc\ \text{sen}\ u \ \Rightarrow y' = \frac{u'}{\sqrt{1-u^2}}.$
16. $y = arc\ \cos\ u \ \Rightarrow y' = \frac{-u'}{\sqrt{1-u^2}}.$
17. $y = arc\ \text{tg}\ u \ \Rightarrow y' = \frac{u'}{1+u^2}.$
18. $y = arc\ \cot g\ u \ \Rightarrow \frac{-u'}{1+u^2}.$
19. $y = arc\ \sec\ u, \ |u| \geqslant 1$
    $\Rightarrow y' = \frac{u'}{|u|\sqrt{u^2-1}}, |u| > 1.$
20. $y = arc\ \text{cosec}\ u, \ |u| \geqslant 1$
    $\Rightarrow y' = \frac{-u'}{|u|\sqrt{u^2-1}}, |u| > 1.$

• *Identidades Trigonométricas*

1. $\text{sen}^2 x + \cos^2 x = 1.$
2. $1 + \text{tg}^2 x = \sec^2 x.$
3. $1 + \text{cotg}^2 x = \text{cosec}^2 x.$
4. $\text{sen}^2 x = \frac{1-\cos\ 2x}{2}.$
5. $\cos^2 x = \frac{1+\cos\ 2x}{2}.$
6. $\text{sen}\ 2x = 2\ \text{sen}\ x\ \cos\ x.$
7. $2\ \text{sen}\ x\ \cos\ y = \text{sen}\,(x-y) + sen\,(x+y).$
8. $2\ \text{sen}\ x\ \text{sen}\ y = \cos\,(x-y) - \cos\,(x+y).$
9. $2\ \cos\ x\ \cos\ y = \cos\,(x-y) + \cos\,(x+y).$
10. $1 \pm \text{sen}\ x = 1 \pm \cos\left(\frac{\pi}{2} - x\right).$

Definição Formal

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Regras de Derivação

Constante: $(c)' = 0$

Multiplicação por constante: $(c.x)' = c$

Potência: $(x^n)' = nx^{n-1}$

Soma: $(f+g)' = f' + g'$

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

Produto: $(f.g)' = f'.g + f.g'$

Cadeia: $(f(g(x)))' = f'(g(x)).\,g'(x) \longrightarrow (x^2+1)^3 = 3(x^2+1)^2 . 2x$

$= 6x(x^2+1)^2$

Outros exemplos para resolver em cadeia

$f(x) = e^{2x} \Rightarrow e^{2x} . 2x'$

$= e^{2x} . 2$

$= 2e^{2x}$

$f(x) = e^{x^2+3x}$

$= e^{x^2+3x} . (2x+3)$

Made with Goodnotes