1 FUNÇÃO DERIVADA ⇒ PÁGINA 175 DO LIVRO MATEMÁTICA 1 PARA OS CURSOS DE ECONOMIA, ADMINISTRAÇÃO E CIÊNCIAS CONTÁBEIS (MEDEIROS, 5ª EDIÇÃO, EDITORA ATLAS)

1 $y = K$

$x_0 = x_0$ $\qquad \Delta x = \cancel{x_0} + \Delta x - \cancel{x_0}$ $\qquad f(x_0) = K$

$x_0 + \Delta x = x_0 + \Delta x$ $\qquad \Delta x = \Delta x$ $\qquad f(x_0 + \Delta x) = K$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{K - K}{\Delta x}$$

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$\frac{\Delta y}{\Delta x} = \frac{0}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 0$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} 0$

$y' = 0$

2) $y = Ax$

$x_0 = x_0$

$x_0 + \Delta x = x_0 + \Delta x$

$\Delta x = \cancel{x_0} + \Delta x - \cancel{x_0}$

$\Delta x = \Delta x$

$f(x_0) = Ax_0$

$f(x_0 + \Delta x) = A(x_0 + \Delta x) = Ax_0 + A\Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\cancel{Ax_0} + A\Delta x - \cancel{Ax_0}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{A\cancel{\Delta x}}{\cancel{\Delta x}}$

$\frac{\Delta y}{\Delta x} = A$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} A$

$y' = A$

3) $y = x^2 + 3x + 10$

$x_0 = x_0$

$x_0 + \Delta x = x_0 + \Delta x$

$\Delta x = \cancel{x_0} + \Delta x - \cancel{x_0}$

$\Delta x = \Delta x$

$f(x_0) = x_0^2 + 3x_0 + 10$

$f(x_0 + \Delta x) = (x_0 + \Delta x)^2 + 3(x_0 + \Delta x) + 10$

$f(x_0 + \Delta x) = x_0^2 + 2x_0\Delta x + \Delta x^2 + 3x_0 + 3\Delta x + 10$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{x_0^2 + 2x_0\Delta x + \Delta x^2 + 3x_0 + 3\Delta x + 10 - (x_0^2 + 3x_0 + 10)}{\Delta x}$

* PÁGINA 179 DO LIVRO MATEMÁTICA 2 PARA OS CURSOS DE ECONOMIA, ADMINISTRAÇÃO E CIÊNCIAS CONTÁBEIS (MEDEIROS, 5ª EDIÇÃO, EDITORA ATLAS)

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$$\frac{\Delta y}{\Delta x} = \frac{\cancel{x_0^2} + 2x_0\Delta x + \Delta x^2 + \cancel{3x_0} + 3\Delta x + \cancel{7} - \cancel{x_0^2} - \cancel{3x_0} - \cancel{7}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{2x_0\Delta x + \Delta x^2 + 3\Delta x}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\cancel{\Delta x}(2x_0 + \Delta x + 3)}{\cancel{\Delta x}}$$

$$\frac{\Delta y}{\Delta x} = 2x_0 + \Delta x + 3$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} 2x_0 + \cancel{\Delta x} + 3$$

$$y' = 2x_0 + 3$$

3 DERIVADA DAS FUNÇÕES USUAIS *

3.2 FUNÇÕES COMPOSTAS

1) $u(x) = 2x + 1$; $x > 0$ $v(x) = \sqrt{x}$

2) $u(x) = 4x - 3$; $x \in \mathbb{R}$ $v(x) = e^x$

3) $u(x) = 2x + 4$; $x \geq 0$ $v(x) = x^{0,5} = \sqrt{x}$

4) $u(x) = \ln x$; $x > 0$ $v(x) = x^5$

5) $u(x) = 1 - \ln x$, $0 < x < e$ $v(x) = \sqrt{x}$

6) $u(x) = \frac{1+2x}{x}$; $x \neq 0$ $v(x) = x^{1/3} = \sqrt[3]{x}$

7) $u(x) = \frac{1-x}{4}$; $x \in \mathbb{R}$ $v(x) = e^x$

8) $u(x) = 2x - 1$; $x > 1$ $v(x) = \ln x$

(9) $u(x) = 2\ln x$, $x > 0$ $v(x) = e^x$

(10) $u(x) = -\frac{1}{2}(x-2)^2$, $x \in \mathbb{R}$ $v(x) = e^x$

(11) $u(x) = \sqrt{1-x}$, $x \leq 1$ $v(x) = x^5$

(12) $u(x) = 1 + \ln x$, $x > 0$ $v(x) = e^x$

(13) $u(x) = 1 - x$, $x \in \mathbb{R}$ $v(x) = (0,2)^x$

(14) $u(x) = \ln(2x-1)$, $x > 10$ $v(x) = \sqrt{x}$

(15) $u(x) = \frac{2x+5}{5}$, $x \in \mathbb{R}$ $v(x) = x^{\ln 2}$

(5.3) DERIVADA DAS FUNÇÕES COMPOSTAS ⇒ PÁGINA 186 DO LIVRO MATEMÁTICA 1 PARA OS CURSOS DE ECONOMIA, ADMINISTRAÇÃO E CIÊNCIAS CONTÁBEIS (MEDEIROS, 5ª EDIÇÃO, EDITORA ATLAS)

(11) $y = 20$

$y' = (20)'$

$y' = 0$

(12) $y = x^3$

$y' = (x^3)'$

$y' = 3x^{3-1}$

$y' = 3x^2$

(13) $y = 4x^2$

$y' = 4(x^2)'$

$y' = 4(2x^{2-1})$

$y' = 4(2x)$

$y' = 8x$

1.1 $y = 3x^3 + 20$

$y' = (3x^3+20)'$

$y' = (3x^3)' + (20)'$

$y' = [3(x^3)'] + 0$

$y' = [3(3x^{3-1})]$

$y' = [3(3x^2)]$

$y' = 9x^2$

1.3 $y = 10x + 5$

$y' = (10x+5)'$

$y' = (10x)' + (5)'$

$y' = [10(x)'] + 0$

$y' = [10(1x^{1-1})]$

$y' = [10(1x^0)]$

$y' = [10(1.1)]$

$y' = [10.1]$

$y' = 10$

1.6 $y = x^2 - 6x + 8$

$y' = (x^2-6x+8)'$

$y' = (x^2)' - (6x)' + (8)'$

$y' = (2x^{2-1}) - [6(x)'] + 0$

$y' = 2x - [6(1x^{1-1})]$

$y' = 2x - [6(1x^0)]$

$y' = 2x - [6(1.1)]$

$y' = 2x - [6.1]$

$y' = 2x - 6$

1.7 $y = x^3 - 10x^2 + 30$

$y' = (x^3 - 10x^2 + 30)'$

$y' = (x^3)' - (10x^2)' + (30)'$

$y' = (3x^{3-1}) - [10(x^2)'] + 0$

$y' = 3x^2 - [10(2x^{2-1})]$

$y' = 3x^2 - [10(2x)]$

$y' = 3x^2 - 20x$

1.8 $y = \frac{5}{3}x^3 - \frac{2}{5}x^2 + 10x + 1$

$y' = \left(\frac{5}{3}x^3 - \frac{2}{5}x^2 + 10x + 1\right)'$

$y' = \left(\frac{5}{3}x^3\right)' - \left(\frac{2}{5}x^2\right)' + (10x)' + (1)'$

$y' = \left[\frac{5}{3}(x^3)'\right] - \left[\frac{2}{5}(x^2)'\right] + [10(x)'] + 0$

$y' = \left[\frac{5}{3}(3x^{3-1})\right] - \left[\frac{2}{5}(2x^{2-1})\right] + [10(1x^{1-1})]$

$$y' = \left[\frac{4}{3}(3x^2)\right] - \left[\frac{2}{5}(2x)\right] + \left[10(1x^0)\right]$$

$$y' = 4x^2 - \frac{4x}{5} + \left[10(1.1)\right]$$

$$y' = 4x^2 - \frac{4x}{5} + \left[10 \cdot 1\right]$$

$$y' = 4x^2 - \frac{4x}{5} + 10$$

1.9 $y = \dfrac{x^4 - 6x^2 + 20}{10}$

$$y = \frac{x^4}{10} - \frac{\overset{3}{\cancel{6}}x^2}{\underset{5}{\cancel{10}}} + \frac{20}{10}$$

$$y = \frac{x^4}{10} - \frac{3x^2}{5} + 10$$

$$y' = \left(\frac{x^4}{10} - \frac{3x^2}{5} + 2\right)'$$

$$y' = \left(\frac{x^4}{10}\right)' - \left(\frac{3x^2}{5}\right)' + (2)'$$

$$y' = \left(\frac{(x^4)' \cdot 10 - x^4(10)'}{10^2}\right) - \left(\frac{(3x^2)' \cdot 5 - 3x^2(5)'}{5^2}\right) + 0$$

$$y' = \left(\frac{(4x^{4-1}) \cdot 10 - x^4 \cdot 0}{100}\right) - \left(\frac{[3(x^2)'] \cdot 5 - 3x^2 \cdot 0}{25}\right)$$

$$y' = \left(\frac{4x^3 \cdot 10 - 0}{100}\right) - \left(\frac{[3(2x^{2-1})] \cdot 5 - 0}{25}\right)$$

$$y' = \left(\frac{4x^3 \cdot \cancel{10}}{\cancel{100}_{10}}\right) - \left(\frac{[3(2x)] \cdot \cancel{5}}{\cancel{25}_5}\right)$$

$$y' = \frac{4x^3}{10} - \left(\frac{[6x] \cdot 1}{5}\right)$$

$$y' = \frac{4x^3}{10} - \frac{6x}{5} = \frac{4x^3 - 12x}{10}$$

1.10 $y = 12x^{0,5}$

$$y' = (12x^{0,5})'$$

$$y' = [12(x^{0,5})']$$

$$y' = [12(0,5x^{0,5-1})]$$

$$y' = [12(0,5x^{-0,5})]$$

$$y' = 6x^{-0,5}$$

2.1 $y = 3e^x$

$y' = (3e^x)'$
$y' = 3(e^x)'$
$y' = 3e^x$

2.2 $y = 3\ln x$

$y' = (3\ln x)'$
$y' = 3(\ln x)'$
$y' = 3 \cdot \frac{1}{x}$

$y' = \frac{3}{x}$

2.3 $y = 10^x$

$y' = (10^x)'$
$y' = 10^x \ln 10$

2.4 $y = 2\ln x + 2^x + 1$

$y' = (2\ln x + 2^x + 1)'$
$y' = (2\ln x)' + (2^x)' + (1)'$
$y' = [2(\ln x)'] + (2^x \ln 2) + 0$
$y' = \left[2 \cdot \frac{1}{x}\right] + 2^x \ln 2$

$y' = \frac{2}{x} + 2^x \ln 2$

2.5 $y = 3e^x + 10\ln x - 8$

$y' = (3e^x + 10\ln x - 8)'$
$y' = (3e^x)' + (10\ln x)' - (8)'$
$y' = [3(e^x)'] + [10(\ln x)'] - 0$
$y' = [3e^x] + \left[10 \cdot \frac{1}{x}\right]$

$y' = 3e^x + \frac{10}{x}$

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2.6 $y = x^2 - 2e^x + 10$

$y' = (x^2 - 2e^x + 10)'$

$y' = (x^2)' - (2e^x)' + (10)'$

$y' = (2x^{2-1}) - 2(e^x)' + 0$

$y' = 2x - 2e^x$

$y' = 2(x - e^x)$

2.7 $y = 3x^5 - \ln x + 5$

$y' = (3x^5 - \ln x + 5)'$

$y' = (3x^5)' - (\ln x)' + (5)'$

$y' = 3(x^5)' - \frac{1}{x} + 0$

$y' = 3(5x^{5-1}) - \frac{1}{x}$

$y' = 3(5x^4) - \frac{1}{x}$

$y' = 15x^4 - \frac{1}{x}$

2.8 $y = x^2 - 2^x + 6\ln x + 1$

$y' = (x^2 - 2^x + 6\ln x + 1)'$

$y' = (x^2)' - (2^x)' + (6\ln x)' + (1)'$

$y' = (2x^{2-1}) - (2^x \ln 2) + 6(\ln x)' + 0$

$y' = 2x - 2^x \ln 2 + 6 \cdot \frac{1}{x}$

$y' = 2x - 2^x \ln 2 + \frac{6}{x}$

2.9 $y = \frac{6x^2 - 5e^x}{3}$

$y = \frac{\cancel{6}^{2} x^2}{\cancel{3}_{1}} - \frac{5e^x}{3}$

$y = 2x^2 - \frac{5e^x}{3}$

$y' = \left(2x^2 - \frac{5e^x}{3}\right)'$

$y' = (2x^2)' - \left(\frac{5e^x}{3}\right)'$

$y' = 2(x^2)' - \frac{5}{3}(e^x)'$

$$y' = 2(2x^{2-1}) - \frac{5}{3}e^x$$

$$y' = 2(2x) - \frac{5}{3}e^x$$

$$y' = 4x - \frac{5}{3}e^x = \frac{12x - 5e^x}{3}$$

2.10 $y = \frac{x^3}{3} - 6\ln x + 10$

$$y' = \left(\frac{x^3}{3} - 6\ln x + 10\right)'$$

$$y' = \left(\frac{x^3}{3}\right)' - (6\ln x)' + (10)'$$

$$y' = \frac{1}{3}(x^3)' - 6(\ln x)' + 0$$

$$y' = \frac{1}{3}(3x^{3-1}) - 6 \cdot \frac{1}{x}$$

$$y' = \frac{1}{\cancel{3}}(\cancel{3}x^2) - \frac{6}{x}$$

$$y' = x^2 - \frac{6}{x}$$

3.1 $y = e^{10-2x}$

$e^{10-2x} = e^u$

$$y' = (e^{10-2x})'$$

$$y' = e^{10-2x}(10-2x)'$$

$$y' = e^{10-2x}[(10)' - (2x)']$$

$$y' = e^{10-2x}[0-2]$$

$$y' = e^{10-2x}[-2]$$

$$y' = -2e^{10-2x}$$

3.2 $y = 5\ln(2x+5)$

$\ln(2x+5) = \ln u$

$$y' = [5\ln(2x+5)]'$$

$$y' = 5[\ln(2x+5)]'$$

$$y' = 5\left[\frac{(2x+5)'}{(2x+5)}\right]$$

$$y' = 4\left[\frac{(2x)'+(5)'}{2x+5}\right]$$

$$y' = 4\left[\frac{2+0}{2x+5}\right]$$

$$y' = 4\left[\frac{2}{2x+5}\right]$$

$$y' = \frac{8}{2x+5}$$

3.3 $y = 10^{1-6x}$

$10^{1-6x} = a^{u}$

$$y' = \left(10^{1-6x}\right)'$$

$$y' = 10^{1-6x}\ln 10\,(1-6x)'$$

$$y' = 10^{1-6x}\ln 10\,[(1)'-(6x)']$$

$$y' = 10^{1-6x}\ln 10\,[0-6]$$

$$y' = 10^{1-6x}.\ln 10\,(-6)$$

$$y' = -6\ln 10 .\, 10^{1-6x}$$

3.4 $y = (x^2-1)^5$

$(x^2-1)^5 = u^{\alpha}$

$$y' = \left[(x^2-1)^5\right]'$$

$$y' = \left[5(x^2-1)^{5-1}\right](x^2-1)'$$

$$y' = \left[5(x^2-1)^4\right].\left[(x^2)'-(1)'\right]$$

$$y' = 5(x^2-1)^4[2x-0]$$

$$y' = 5(x^2-1)^4[2x]$$

$$y' = 10x\,(x^2-1)^4$$

3.5 $y = 3(1-3x)^4$

$(1-3x)^4 = u^{\alpha}$

$$y' = \left[3(1-3x)^4\right]'$$

$$y' = 3\left[(1-3x)^4\right]'$$

$$y' = 3\left[4(1-3x)^{4-1}.(1-3x)'\right]$$

$$y' = 3\{4(1-3x)^3.[(1)'-(3x)']\}$$

$$y' = 3\{4(1-3x)^3[0-3]\}$$

$$y' = 3\{4(1-3x)^3.(-3)\}$$

$$y' = 3\{-12(1-3x)^3\}$$

$$y' = -36(1-3x)^3$$

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3.6 $y=(2+x^2)^{0,5}$

$(2+x^2)^{0,5}=u^{\alpha}$

$y'=\left[(2+x^2)^{0,5}\right]'$

$y'=\{0,5(2+x^2)^{0,5-1}(2+x^2)'\}$

$y'=\{0,5(2+x^2)^{-0,5}[(2)'+(x^2)']\}$

$y'=\{0,5(2+x^2)^{-0,5}[0+2x]\}$

$y'=\{0,5(2+x^2)^{-0,5}(2x)\}$

$y'=x(2+x^2)^{-0,5}$

$y'=\dfrac{x}{(2+x^2)^{0,5}}=\dfrac{x}{\sqrt{2+x^2}}$

3.7 $y=\sqrt{6x^2+1}$

$y=(6x^2+1)^{0,5}$

$(6x^2+1)^{0,5}=u^{\alpha}$

$y'=\left[(6x^2+1)^{0,5}\right]'$

$y'=\{0,5(6x^2+1)^{0,5-1}(6x^2+1)'\}$

$y'=\{0,5(6x^2+1)^{-0,5}[(6x^2)'+(1)']\}$

$y'=\{0,5(6x^2+1)^{-0,5}[12x+0]\}$

$y'=\{0,5(6x^2+1)^{-0,5}(12x)\}$

$y'=6x(6x^2+1)^{-0,5}$

$y'=\dfrac{6x}{(6x^2+1)^{+0,5}}=\dfrac{6x}{\sqrt{6x^2+1}}$

3.8 $y=4e^{2x}-5\ln x$

$e^{2x}=e^{u}$

$y'=(4e^{2x}-5\ln x)'$

$y'=(4e^{2x})'-(5\ln x)'$

$y'=4(e^{2x})'-5(\ln x)'$

$y'=4[e^{2x}(2x)']-5\dfrac{1}{x}$

$y'=4[e^{2x}2]-\dfrac{5}{x}$

$y'=8e^{2x}-\dfrac{5}{x}$

3.9 $y=6(6x+4)^3-\ln(5-x)$

$y'=\left[6(6x+4)^3-\ln(5-x)\right]'$

$y'=[6(6x+4)^3]'-[\ln(5-x)]'$

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$y' = 6[(6x+1)^3]' - [\ln(5-x)]'$ $\qquad (6x+1)^3 = u^a$

$y' = 6[3(6x+1)^{3-1}(6x+1)'] - \left[\frac{(5-x)'}{5-x}\right]$ $\qquad \ln(5-x) = \ln(u)$

$y' = 6\{3(6x+1)^2[(6x)'+(1)']\} - \left[\frac{(5)'-(x)'}{5-x}\right]$

$y' = 6\{3(6x+1)^2[6+0]\} - \left[\frac{0-1}{5-x}\right]$

$y' = 6\{3(6x+1)^2(6)\} - \left[\frac{-1}{5-x}\right]$

$y' = 6(18(6x+1)^2) + \frac{1}{5-x}$

$y' = 108(6x+1)^2 + \frac{1}{5-x}$

3.10 $y = \frac{3x^2 - e^{x^2} + 10}{5}$

$y = \frac{3x^2}{5} - \frac{e^{x^2}}{5} + \frac{10}{5}$

$y = \frac{3x^2}{5} - \frac{e^{x^2}}{5} + 2$

$e^{x^2} = e^u$

$y' = \left(\frac{3x^2}{5} - \frac{e^{x^2}}{5} + 2\right)'$

$y' = \left(\frac{3x^2}{5}\right)' - \left(\frac{e^{x^2}}{5}\right)' + (2)'$

$y' = \frac{3}{5}(x^2)' - \frac{1}{5}(e^{x^2})' + 0$

$y' = \frac{3}{5}(2x) - \frac{1}{5}[e^{x^2}(x^2)']$

$y' = \frac{6x}{5} - \frac{1}{5}[e^{x^2} \cdot 2x]$

$y' = \frac{6x}{5} - \frac{1}{5}(2xe^{x^2})$

$y' = \frac{6x}{5} - \frac{2xe^{x^2}}{5}$

$y' = \frac{6x - 2xe^{x^2}}{5} = \frac{2x(3-e^{x^2})}{5}$

4.1 $y = 4x \cdot e^x$

$(u \cdot v)'$

$y' = (4x \cdot e^x)'$

$y' = 4x(e^x)' + (4x)'e^x$

$y' = 4xe^x + 4e^x$

$y' = 4e^x(x+1)$

4.2 $y = x^2 \cdot \ln x$

$(u \cdot v)'$

$y' = (x^2 \cdot \ln x)'$

$y' = x^2(\ln x)' + (x^2)'\ln x$

$y' = x^2 \cdot \frac{1}{x} + 2x\ln x$

$y' = x + 2x\ln x$

$y' = x(1 + 2\ln x)$

4.3 $y = (2x+1) \cdot e^{1-x}$

$e^{1-x} = e^u$

$y' = [(2x+1) \cdot e^{1-x}]'$

$y' = (2x+1)(e^{1-x})' + (2x+1)'e^{1-x}$

$y' = (2x+1)[e^{1-x}(1-x)'] + [(2x)' + (1)']e^{1-x}$

$y' = (2x+1)\{e^{1-x}[(1)' - (x)']\} + [2+0]e^{1-x}$

$y' = (2x+1)\{e^{1-x}[0-1]\} + 2e^{1-x}$

$y' = (2x+1)\{-e^{1-x}\} + 2e^{1-x}$

$y' = -e^{1-x}(2x+1) + 2e^{1-x}$

4.4 $y = \frac{x}{1-x}$

$y' = \left(\frac{x}{1-x}\right)'$

$y' = \frac{(x)'(1-x) - x(1-x)'}{(1-x)^2}$

$y' = \frac{1(1-x) - x[(1)' - (x)']}{(1-x)^2}$

$y' = \frac{1-x-x[0-1]}{(1-x)^2}$

$y' = \frac{1-x-x(-1)}{(1-x)^2}$

$y' = \frac{1-\cancel{x}+\cancel{x}}{(1-x)^2}$

$y' = \frac{1}{(1-x)^2}$

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1.5 $y = \frac{x^2}{x+4}$

$$y' = \left(\frac{x^2}{x+4}\right)'$$

$$y' = \frac{(x^2)'(x+4) - x^2(x+4)'}{(x+4)^2}$$

$$y' = \frac{2x(x+4) - x^2[(x)' + (4)']}{(x+4)^2}$$

$$y' = \frac{2x^2 + 8x - x^2[1 + 0]}{(x+4)^2}$$

$$y' = \frac{2x^2 + 8x - x^2(1)}{(x+4)^2}$$

$$y' = \frac{2x^2 + 8x - x^2}{(x+4)^2}$$

$$y' = \frac{x^2 + 8x}{(x+4)^2}$$

1.6 $y = \frac{e^x}{1+x}$

$$y' = \left(\frac{e^x}{1+x}\right)'$$

$$y' = \frac{(e^x)'(1+x) - e^x(1+x)'}{(1+x)^2}$$

$$y' = \frac{e^x(1+x) - e^x[(1)' + (x)']}{(1+x)^2}$$

$$y' = \frac{e^x + xe^x - e^x[0 + 1]}{(1+x)^2}$$

$$y' = \frac{e^x + xe^x - e^x(1)}{(1+x)^2}$$

$$y' = \frac{e^x + xe^x - e^x}{(1+x)^2}$$

$$y' = \frac{xe^x}{(1+x)^2}$$

4.7 $y = \dfrac{\ln x}{x}$

$$y' = \left(\frac{\ln x}{x}\right)'$$

$$y' = \frac{(\ln x)' x - \ln x (x)'}{x^2}$$

$$y' = \frac{\frac{1}{\cancel{x}} \cdot \cancel{x} - \ln x \cdot 1}{x^2}$$

$$y' = \frac{1 - \ln x}{x^2}$$

4.8 $y = \dfrac{1+x^2}{1-x^2}$

$$y' = \left(\frac{1+x^2}{1-x^2}\right)'$$

$$y' = \frac{(1+x^2)'(1-x^2) - (1+x^2)(1-x^2)'}{(1-x^2)^2}$$

$$y' = \frac{[(1)' + (x^2)'](1-x^2) - (1+x^2)[(1)' - (x^2)']}{(1-x^2)^2}$$

$$y' = \frac{[0 + 2x](1-x^2) - (1+x^2)[0 - 2x]}{(1-x^2)^2}$$

$$y' = \frac{2x(1-x^2) - [(1+x^2)(-2x)]}{(1-x^2)^2}$$

$$y' = \frac{2x - 2x^3 - [-2x - 2x^3]}{(1-x^2)^2}$$

$$y' = \frac{2x - \cancel{2x^3} + 2x + \cancel{2x^3}}{(1-x^2)^2}$$

$$y' = \frac{4x}{(1-x^2)^2}$$

4.9 $y = (2x+4)\ln 3x$

$$y' = [(2x+4)\ln 3x]'$$

$$y' = (2x+4)(\ln 3x)' + (2x+4)' \ln 3x$$

$$y' = (2x+4)[(\ln 3 + \ln x)'] + [(2x)' + (4)'] \ln 3x$$

$$y' = (2x+4)[(\ln 3)' + (\ln x)'] + [2+0] \ln 3x$$

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$$y' = (2x+5)\left[0 + \frac{1}{x}\right] + 2\ln 3x$$

$$y' = (2x+5)\frac{1}{x} + 2\ln 3x$$

$$y' = 2 + \frac{5}{x} + 2\ln 3x$$

1.10 $y = \dfrac{6x}{2\ln 5x}$

$$y' = \left(\frac{6x}{2\ln 5x}\right)'$$

$$y' = \frac{6}{2}\left(\frac{x}{\ln 5x}\right)'$$

$$y' = 3\frac{[(x)'\ln 5x - x(\ln 5x)']}{(\ln 5x)^2}$$

$$y' = 3\frac{[1\ln 5x - x(\ln 5 + \ln x)']}{(\ln 5x)^2}$$

$$y' = 3\frac{\{\ln 5x - x[(\ln 5)' + (\ln x)']\}}{(\ln 5x)^2}$$

$$y' = 3\frac{\{\ln 5x - x[0 + \frac{1}{x}]\}}{(\ln 5x)^2}$$

$$y' = \frac{3[\ln 5x - x(\frac{1}{x})]}{(\ln 5x)^2}$$

$$y' = \frac{3(\ln 5x - 1)}{(\ln 5x)^2}$$