$$z = 15x^2y + (2x^3 - 8xy^2)(\arcsin(3x+1) - \underbrace{3^{x+y}}_{3^x\cdot 3^y}) + \ln tg(3x+9y)$$

$$z'_x = 15y\cdot 2x + (2\cdot 3x^2 - 8y^2)(\arcsin(3x+1) - 3^{x+y}) + (2x^3 - 8xy^2)\left(\frac{3}{\sqrt{1-(3x+1)^2}} - 3^y 3^x \ln 3\right) +$$

$$+ \frac{1}{tg(3x+9y)} \cdot \frac{1}{\cos^2(3x+9y)} \cdot (3+0) =$$

$$= 30xy + (6x^2 - 8y)(\arcsin(3x+1) - 3^{x+y}) + (2x^3 - 8xy^2)\left(\frac{3}{\sqrt{1-(3x+1)^2}} - 3^{x+y}\ln 3\right) +$$

$$+ 3\,\frac{1}{tg(3x+9y)} \cdot \frac{1}{\cos^2(3x+9y)}$$

$$z = 15x^2y + (2x^3 - 8xy^2)(\arcsin(3x+1) - \underbrace{3^{x+y}}_{3^x\cdot 3^y}) + \ln tg(3x+9y)$$

$$z'_y = 15x^2 + (-16xy)(\arcsin(3x+1) - 3^{x+y}) + (2x^3 - 8xy^2)(0 - 3^x\cdot 3^y \ln 3) +$$

$$+ \frac{1}{tg(3x+9y)} \cdot \frac{1}{\cos^2(3x+9y)} \cdot 9$$

$(x)'_x = 1 \quad (x)'_y = 0$

$(y)'_y = 1 \quad (y)'_x = 0$

Pr: $z = \sqrt[4]{(3y - 8x^5 - 2xy)^3} = (3y - 8x^5 - 2xy)^{\frac{3}{4}}$

$$z'_x = \frac{3}{4}(3y - 8x^5 - 2xy)^{-\frac{1}{4}}(0 - 40x^4 - 2y) = \frac{-3(40x^4 + 2y)}{4\cdot\sqrt[4]{3y - 8x^5 - 2xy}}$$

$$z'_y = \frac{3}{4}(3y - 8x^5 - 2xy)^{-\frac{1}{4}}(3 - 0 - 2x) = \frac{3(3-2x)}{4\cdot\sqrt[4]{3y - 8x^5 - 2xy}}$$

$(\overset{=k}{2xy})'_x = 2y\cdot\underbrace{(x)'_x}_{1} = 2y$ $\qquad (kx)'_x = k\underbrace{(x)'_x}_{1} = k$

$(\overset{=k}{2x}y)'_y = 2x\cdot(y)'_y = 2x$ $\qquad (y)'_y = 1$

Pr: $z = 2x^2y^3(5^y + 3xy)$

$$z'_x = 4xy^3(5^y + 3xy) + 2x^2y^3(0 + 3y) = \underbrace{4xy^3}_{f}\underbrace{(5^y + 3xy)}_{g} + 6x^2y^4$$

$$z'_y = 6x^2y^2(5^y + 3xy) + 2x^2y^3(5^y\ln 5 + 3x) \qquad (f\cdot g)' = f'g + fg'$$

$$z''_{xx} = \overbrace{4y^3}^{f'}\overbrace{(5^y + 3xy)}^{g} + \overbrace{4xy^3}^{f}\cdot\overbrace{3y}^{g'} + 12xy^4$$

$$z''_{xy} = \overbrace{12xy^2}^{f'}\overbrace{(5^y + 3xy)}^{g} + \overbrace{4xy^3}^{f}\overbrace{(5^y\ln 5 + 3x)}^{g'} + 24x^2y^3$$

$(6x^2y^4)'_y = 6x^2(y^4)'_y = 6x^2\cdot 4y^3 = 24x^2y^3$

$$z''_{yx} = 12xy^2(5^y + 3xy) + 6x^2y^2\cdot 3y + 4xy^3\cdot(5^y\ln 5 + 3x) + 2x^2y^3\cdot 3$$

$$z''_{yy} = 12x^2y(5^y + 3xy) + 6x^2y^2(5^y\ln 5 + 3x) + 6x^2y^2(5^y\ln 5 + 3x) + 2x^2y^3(5^y\ln^2 5 + 0)$$

Pr: $z = (2x + 5y)\sin(3x)$

$$z'_x = 2\sin(3x) + (2x + 5y)\cdot 3\cdot\cos(3x)$$

$$z'_y = 5\sin(3x)$$

$$z''_{xx} = 6\cos(3x) + 6\cos(3x) + (2x + 5y)\cdot 3(-3\sin(3x)) = 12\cos(3x) - 9(2x+5y)\sin(3x)$$

$$z''_{xy} = 3\cos(3x)\cdot 5 = 15\cos(3x)$$

$$z''_{yx} = 15\cos(3x)$$

$$z''_{yy} = 0$$

Pr: $z = \log_3(x^7y + 14x)$

$$z'_x = \frac{7x^6y + 14}{(x^7y + 14x)\ln 3} \qquad z'_y = \frac{x^7}{(x^7y + 14x)\ln 3}$$

$$z''_{xx} = \frac{42x^5y\ln 3(x^7y + 14x) - (7x^6y + 14)\ln 3\cdot(7x^6y + 14)}{\ln^2 3\,(x^7y + 14x)^2}$$

$$z''_{xy} = \frac{7x^6\ln 3(x^7y + 14x) - (7x^6y + 14)\ln 3\cdot x^7}{\ln^2 3\,(x^7y + 14x)^2}$$

$$z''_{yx} = \frac{7x^6(x^7y + 14x)\ln 3 - x^7\ln 3(7x^6y + 14)}{\ln^2 3\,(x^7y + 14x)^2}$$

$$z''_{yy} = \frac{0 - x^7\cdot x^7\ln 3}{\ln^2 3\,(x^7y + 14x)^2} = \frac{-x^{14}}{\ln 3\,(x^7y + 14x)^2}$$

Pr: DERIVÁCIE 1.r fcie: $z = e^{\cos(11x + 17y^2)} - \dfrac{\cot g x + 2y}{4x^2y^3 - 3y^2x^3}$

$$z'_x = -11\,e^{\cos(11x + 17y^2)}\cdot\sin(11x + 17y^2) - \frac{\left(-\frac{1}{\sin^2 x} + 0\right)(4x^2y^3 - 3y^2x^3) - (\cot g x + 2y)(8xy^3 - 9y^2x^2)}{(4x^2y^3 - 3y^2x^3)^2}$$

$$z'_y = -34y\,e^{\cos(11x + 17y^2)}\,\sin(11x + 17y^2) - \frac{2(4x^2y^3 - 3x^2y^3) - (\cot g x + 2y)(12x^2y^2 - 6yx^3)}{(4x^2y^3 - 3y^2x^3)^2}$$