

Regla de la cadena

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$$\frac{\partial f_1}{\partial x} = 2x + y$$

$$\frac{\partial f_1}{\partial y} = x$$

$$\frac{\partial f_2}{\partial x} = 0$$

$$\frac{\partial f_2}{\partial y} = 2y$$

$$\Rightarrow Df = \begin{pmatrix} 2x+y & x \\ 0 & 2y \end{pmatrix}$$

$$\frac{\partial g}{\partial u} = (1, 2, 0)$$

$$\frac{\partial g}{\partial v} = (1, 0, 2\sqrt{v})$$

$$Dg = \begin{pmatrix} 1 & 1 \\ 2 & 0 \\ 0 & 2\sqrt{v} \end{pmatrix}$$

$$Dg_{f(x,y)} = \begin{pmatrix} 1 & 1 \\ 2 & 0 \\ 0 & 2y^2+4 \end{pmatrix}$$

$$Dg \circ Df_{f(x,y)} = \begin{pmatrix} 1 & 1 \\ 2 & 0 \\ 0 & 2y^2+4 \end{pmatrix} \begin{pmatrix} 2x+y & x \\ 0 & 2y \end{pmatrix}$$

$$= \begin{pmatrix} 2x+y & x+2y \\ 4x+2y & 2y \\ 0 & 4y^3+8y \end{pmatrix} \Rightarrow Dg \circ f_{f(1,1)} = \begin{pmatrix} 3 & 3 \\ 6 & 4 \\ 0 & 12 \end{pmatrix}$$

$$(18) \quad \frac{\partial f}{\partial x} = \frac{\partial f}{\partial u} \cdot \frac{\partial u}{\partial x}$$

$$\frac{\partial f}{\partial u} = v e^{uv} \sin(u^2 + v^2) + 2u e^{uv} \cos(u^2 + v^2)$$

$$\frac{\partial f(x+y, xy)}{\partial u} = xy e^{(x+y)xy} \sin((x+y)^2 + (xy)^2) + 2(x+y) e^{xy(x+y)} \cos((x+y)^2 + (xy)^2)$$

$$\frac{\partial u}{\partial x} = 1$$

$$\frac{\partial f}{\partial x} = xy e^{(x+y)xy} \sin((x+y)^2 + (xy)^2) + 2(x+y) e^{xy(x+y)} \cos((x+y)^2 + (xy)^2)$$

$$\frac{\partial f}{\partial y} = \frac{\partial f}{\partial v} \cdot \frac{\partial v}{\partial y}$$

$$\frac{\partial f}{\partial v} = u e^{uv} \sin(u^2 + v^2) + 2v e^{uv} \cos(u^2 + v^2)$$

$$\frac{\partial f(x+y, xy)}{\partial v}$$