Universidad de Santiago
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Ejercicios de Derivadas Parciales
Matemáticas II
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(1) Determine las derivadas parciales $\dfrac{\partial f}{\partial x}$ y $\dfrac{\partial f}{\partial y}$ de las siguientes funciones:

1. $f(x,y) = (x^2y^2+1)(x-y^2)^7$
2. $f(x,y) = \dfrac{x^3-2y^3}{x-y}$
3. $f(x,y) = e^{x^2y^3+xy-1}$
4. $f(x,y) = e^{xy(\cos x^2 y+\sin xy^2)}$
5. $f(x,y) = \ln^3(xy^2+3)$

(2) Verifique si $\dfrac{\partial^2 f}{\partial y \partial x} = \dfrac{\partial^2 f}{\partial x \partial y}$

1. $z = x^2-4xy+3y^2$
2. $z = 2x^3-3xy^2+x^2y$
3. $z = x^2e^{-y^2}$
4. $z = xye^{-xy}$
5. $z = \ln(x+y)$
6. $z = x^2\cos\dfrac{1}{y^2}$

(3) En los siguientes ejercicios encuentre $\dfrac{\partial z}{\partial s}$ y $\dfrac{\partial z}{\partial t}$.

1. $z = \ln\sqrt{(x^2+y^2)}$; $x = s-t$; $y = s^2-t^3$.
2. $z = \cos(x^2-2y^2)$; $x = 3s^3-t^2$; $y = s$.
3. $z = e^{x^2-y^3}$; $x = t+2$; $y = s-t$.

(4) En los siguientes ejercicios determine $\dfrac{dy}{dx} = y'$

1. $\dfrac{2x^3}{y^2} - \dfrac{y^3}{x+y} = 1$
2. $x^{\frac{2}{3}} - y^{\frac{2}{3}} = x^4-1$
3. $x^3y^4 + e^{x-y}x^2 + \ln(xy) = 6\,\mathrm{sen}(x+y)$

(5) Suponga que $w = f(x, y)$; $x = r\cos\theta$; $y = r\sin\theta$. Demuestre que:

$$\left(\frac{\partial w}{\partial x}\right)^2 + \left(\frac{\partial w}{\partial y}\right)^2 = \left(\frac{\partial w}{\partial r}\right)^2 + \frac{1}{r^2}\left(\frac{\partial w}{\partial \theta}\right)^2$$

(6) Suponga que $w = f(u)$ y que $u = x + y$. Demuestre que $\dfrac{\partial w}{\partial x} = \dfrac{\partial w}{\partial y}$

(7) Suponga que $w = f(x, y)$; $x = e^u \cos v$;$y = e^u \sin v$. Demuestre que

$$\left(\frac{\partial w}{\partial x}\right)^2 + \left(\frac{\partial w}{\partial y}\right)^2 = e^{-2u}\left[\left(\frac{\partial w}{\partial u}\right)^2 + \left(\frac{\partial w}{\partial v}\right)^2\right]$$

(8) Si $w = f(x, y)$ y existe una constante "a", tal que $x = u\cos a - v\sin a$;
$y = u\sin a + v\cos a$. Demuestre que

$$\left(\frac{\partial w}{\partial u}\right)^2 + \left(\frac{\partial w}{\partial v}\right)^2 = \left(\frac{\partial w}{\partial x}\right)^2 + \left(\frac{\partial w}{\partial y}\right)^2$$