Calculus 2

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Exercices 8

Partial Derivatives

1- If

$$f(x, y) = x^3 + x^2y^3 - 2y^2,$$

find $f_x(2, 1)$ and $f_y(2, 1)$.

2- If

$$f(x, y) = 4 - x^2 - 2y^2,$$

find $f_x(1, 1)$ and $f_y(1, 1)$.

3- If

$$f\ \ x, y\ \ = \sin\left(\frac{x}{1+y}\right),$$

calculate $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$.

4- If

$$f(x, y, z) = e^{xy} \ln z.$$

find f_x, f_y, and f_z

5- if

$$f(x, y, z) = \sin(3x + yz),$$

Calculate f_{xxyz}

6-Let

$$z = e^x \cos y,$$

$x = \sin t$ **and** $y = t^2$. Find

- Find the total differential for each function.

  a. $z = 2x \sin y - 3x^2y^2$ **b.** $w = x^2 + y^2 + z^2$

- Let $w = x^2y - y^2$, where $x = \sin t$ and $y = e^t$. Find dw/dt when $t = 0$.

- Find $\partial w/\partial s$ and $\partial w/\partial t$ when $s = 1$ and $t = 2\pi$ for

  $$w = xy + yz + xz$$

  where $x = s \cos t$, $y = s \sin t$, and $z = t$.

Find dy/dx for

$$y^3 + y^2 - 5y - x^2 + 4 = 0.$$

Find $\partial z/\partial x$ and $\partial z/\partial y$ for

$$3x^2z - x^2y^2 + 2z^3 + 3yz - 5 = 0.$$

If $f(x, y) = \left(\frac{x}{1 + y}\right)^5$, calculate $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$.

If $g(v, w) = we^{vw}$, find g_v and g_w.

If $f(x, y) = x \cos y + ye^x$, find the second-order derivatives

$$\frac{\partial^2 f}{\partial x^2}, \quad \frac{\partial^2 f}{\partial y\, \partial x}, \quad \frac{\partial^2 f}{\partial y^2}, \quad \text{and} \quad \frac{\partial^2 f}{\partial x\, \partial y}.$$

Find f_{yxyz} if $f(x, y, z) = 1 - 2xy^2z + x^2y$.

Evaluate at the given value of t

Function	Value
1. $w = x^2 + y^2$	$t = 2$
$x = 2t,\ y = 3t$	
2. $w = \sqrt{x^2 + y^2}$	$t = 0$
$x = \cos t,\ y = e^t$	
3. $w = x \sin y$	$t = 0$
$x = e^t,\ \ y = \pi - t$	
4. $w = \ln \dfrac{y}{x}$	$t = \dfrac{\pi}{4}$
$x = \cos t,\ y = \sin t$	

Fiind dy/dx

$$x^2 - xy + y^2 - x + y = 0$$

$$\ln\sqrt{x^2 + y^2} + x + y = 4$$

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

Fiind dz/dx

- $x^2 + y^2 + z^2 = 1$
- $x^2 + 2yz + z^2 = 1$
- $\tan(x + y) + \tan(y + z) = 1$
- $z = e^x \sin(y + z)$
- $e^{xz} + xy = 0$
- $x \ln y + y^2 z + z^2 = 8$
- $xz + yz + xy = 0$
- $x + \sin(y + z) = 0$

Thank you for your attention