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Multivariable Calculus 1: Vectors and Derivatives

Help sandipan_dey

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12. Computing partial derivatives: practice

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Lecture due Aug 4, 2021 20:30 IST Completed

Practice

Practice 1

2.0/2 points (graded)
Let $f(x,y) = 8x^7 - x\sqrt{y}$.

Compute:

$f_x(x,y) =$ 56*x^6-sqrt(y) ✓

$f_y(x,y) =$ -x/(2*sqrt(y)) ✓

? INPUT HELP

Submit You have used 1 of 5 attempts

Practice 2

2.0/2 points (graded)
Let $h(x,t) = e^{-3t}\cos(\pi x)$.

Compute:

$h_x(x,t) =$ -pi*e^(-3*t)*sin(pi*x) ✓ **Answer:** -pi*exp(-3*t)*sin(pi*x)

$h_t(x,t) =$ -3*exp(-3*t)*cos(pi*x) ✓ **Answer:** -3*exp(-3*t)*cos(pi*x)

? INPUT HELP

Solution:

To compute h_x, differentiate with respect to x treating t as a constant:

$$\begin{aligned} h_x(x,t) &= \frac{\partial}{\partial x}\left(e^{-3t}\cos(\pi x)\right) \\ &= e^{-3t}\frac{\partial}{\partial x}\cos(\pi x) \\ &= e^{-3t}\left(-\pi\sin(\pi x)\right) \\ &= -\pi e^{-3t}\sin(\pi x) \end{aligned}$$

from the chain rule.

To compute h_t, differentiate with respect to t treating x as a constant:

$$\begin{aligned} h_t(x,t) &= \frac{\partial}{\partial t}\left(e^{-3t}\cos(\pi x)\right) \\ &= \cos(\pi x)\frac{\partial}{\partial t}e^{-3t} \end{aligned}$$

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$$\begin{aligned} &= \cos(\pi x)\left(-3e^{-3t}\right) \\ &= -3e^{-3t}\cos(\pi x) \end{aligned}$$

from the chain rule.

Submit You have used 1 of 5 attempts

Answers are displayed within the problem

Practice 3

3.0/3 points (graded)

Let $g(x,y,z) = x\ln(y-z)$.

Compute:

$g_x(x,y,z) =$ ln(y-z) ✓ **Answer:** ln(y-z)

$g_y(x,y,z) =$ x/(y-z) ✓ **Answer:** x/(y-z)

$g_z(x,y,z) =$ -x/(y-z) ✓ **Answer:** -x/(y-z)

? INPUT HELP

Solution:

To compute g_x, differentiate with respect to x treating y and z as constants:

$$\begin{aligned} g_x(x,y,z) &= \frac{\partial}{\partial x}(x\ln(y-z)) \\ &= \ln(y-z)\frac{\partial}{\partial x}x \\ &= \ln(y-z)\,. \end{aligned}$$

To compute g_y, differentiate with respect to y treating x and z as constants:

$$\begin{aligned} g_y(x,y,z) &= \frac{\partial}{\partial y}(x\ln(y-z)) \\ &= x\frac{\partial}{\partial y}\ln(y-z) \\ &= \frac{x}{y-z} \end{aligned}$$

from the chain rule.

To compute g_z, differentiate with respect to z treating x and y as constants:

$$\begin{aligned} g_z(x,y,z) &= \frac{\partial}{\partial z}(x\ln(y-z)) \\ &= x\frac{\partial}{\partial z}\ln(y-z) \\ &= \frac{-x}{y-z} \end{aligned}$$

from the chain rule.

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Submit You have used 2 of 5 attempts

Answers are displayed within the problem

Practice 4

2.0/2 points (graded)

Let $q(x,y) = x\sin(y) + e^{3x^2y^2}$.

Compute:

$q_x(x,y) =$

`sin(y)+6*x*y^2*e^(3*x^2*y^2)` ✓

Answer: sin(y)+6*x*y^2*exp(3*x^2*y^2)

$q_y(x,y) =$

`x*cos(y)+6*x^2*y*e^(3*x^2*y^2)` ✓

Answer: x*cos(y)+6*x^2*y*exp(3*x^2*y^2)

? INPUT HELP

Solution:

To compute q_x, differentiate with respect to x treating y as a constant:

$$\begin{aligned} q_x(x,y) &= \frac{\partial}{\partial x}\left(x\sin(y) + e^{3x^2y^2}\right) \\ &= \sin(y)\frac{\partial}{\partial x}x + e^{3x^2y^2}\frac{\partial}{\partial x}(3x^2y^2) \\ &= \sin(y) + 6xy^2e^{3x^2y^2} \end{aligned}$$

from the chain rule.

To compute q_y, differentiate with respect to y treating x as a constant:

$$\begin{aligned} q_y(x,y) &= \frac{\partial}{\partial y}\left(x\sin(y) + e^{3x^2y^2}\right) \\ &= x\frac{\partial}{\partial y}\sin(y) + e^{3x^2y^2}\frac{\partial}{\partial y}(3x^2y^2) \\ &= x\cos(y) + 6x^2ye^{3x^2y^2} \end{aligned}$$

from the chain rule.

Submit You have used 2 of 5 attempts

Answers are displayed within the problem

Identify the mistake

1/1 point (graded)

Consider the function

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$$h\left(x,r,t\right)=t\cos\left(x+t\right)+r^{2}\ln\left(x+t\right)+\frac{t^{3}r}{x}. \qquad (2.25)$$

One of the following partial derivative computations is incorrect. Identify the *incorrect* computation.

○ $\dfrac{\partial h}{\partial x}=-t\sin\left(x+t\right)+\dfrac{r^{2}}{x+t}-\dfrac{t^{3}r}{x^{2}}$

○ $\dfrac{\partial h}{\partial r}=2r\ln\left(x+t\right)+\dfrac{t^{3}}{x}$

● $\dfrac{\partial h}{\partial t}=-t\sin\left(x+t\right)+\dfrac{r^{2}}{x+t}+\dfrac{3t^{2}r}{x}$

✓

Solution:

The first term of the expression for h involves a multiplication of two expressions involving t. So, to compute $\dfrac{\partial h}{\partial t}$, we need to use the product rule.

$$\begin{aligned}\frac{\partial h}{\partial t} &= \frac{\partial}{\partial t}t\cos\left(x+t\right)+\frac{\partial}{\partial t}r^{2}\ln\left(x+t\right)+\frac{\partial}{\partial t}\frac{t^{3}r}{x} && (2.26)\\ &= \cos\left(x+t\right)-t\sin\left(x+t\right)+\frac{r^{2}}{x+t}+\frac{3t^{2}r}{x}. && (2.27)\end{aligned}$$

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

12. Computing partial derivatives: practice

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Hi I was extremely busy last week so I couldn't submit the graded assignments in time. Is there a way to shift the schedule? I can't s... 4

[STAFF] Mistake in solution for Part 3 Practice 3. 2

? [STAFF] Practice 4 the one on (x*sin(y) + e^(3*x^2*y^2))
At first I thought it was my internet, but it happens that this question has suddenly disappeared. I am getting the following message: ... 2

? [STAFF] Scoring issue - Identify the mistake
for the Identify the mistake problem, I got my first try wrong and I clicked on the correct one for the last attempt but I didn't get the ... 2

Correction request
For the last question 3 options and 5 attempts))) Plz reduce, at least to 2 2

Mr.
Forgot about product rule...[REDACTED] 3

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