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← MC 113, section A, Spring 2020

14.3 -14.4 Derivadas Parciales (Homework)

INSTRUCTOR
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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
POINTS	1/1	1/1	1/1	1/1	1/1	1.5/1.5	1.5/1.5	2/2	2/2	2/2	1/1	1/1	0/0	–/0	3/0	2/0	0/1

TOTAL SCORE: 23/26 88.5%

Due Date

TUE, MAR 10, 2020
11:59 PM CST

Request Extension

Description

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

1. 1/1 points | Previous Answers | SCALCET8 14.3.011. | My Notes | Ask Your Teacher

If $f(x, y) = 25 - 5x^2 - y^2$, find $f_x(2, -7)$ and $f_y(2, -7)$ and interpret these numbers as slopes.

$f_x(2, -7) =$ -20 ✓

$f_y(2, -7) =$ 14 ✓

2. 1/1 points | Previous Answers | SCALCET8 14.3.012. | My Notes | Ask Your Teacher

Find $f_x(1, 0)$ and $f_y(1, 0)$ and interpret these numbers as slopes for the following equation.

$f(x, y) = \sqrt{4 - x^2 - 3y^2}$

$f_x(1, 0) =$ −1√3 ✓

$f_y(1, 0) =$ 0 ✓

3. 1/1 points | Previous Answers | SCALCET8 14.3.017. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$f(x, t) = t^8 e^{-x}$

$f_x(x, t) =$ −t8e−x ✓

$f_t(x, t) =$ 8t7e−x ✓

4. 1/1 points | Previous Answers | SCALCET8 14.3.020. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$z = x \sin(xy)$

$\frac{\partial z}{\partial x} =$ sin(xy)+xcos(xy)y ✓

$\frac{\partial z}{\partial y} =$ x2cos(xy) ✓

5. 1/1 points | Previous Answers | SCALCET8 14.3.028. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$f(x, y) = x^{3y}$

$f_x(x, y) =$ 3yx3y−1 ✓

$f_y(x, y) =$ x3yln(x3) ✓

6. 1.5/1.5 points | Previous Answers | SCALCET8 14.3.031. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$f(x, y, z) = x^3yz^2 + 6yz$

$f_x(x, y, z) =$ 3x2yz2 ✓

$f_y(x, y, z) =$ x3z2+6z ✓

$f_z(x, y, z) =$ 2x3yz+6y ✓

7. 1.5/1.5 points | Previous Answers | SCALCET8 14.3.033. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$w = \ln(x + 9y + 3z)$

$\frac{\partial w}{\partial x} =$ 1x+9y+3z ✓

$\frac{\partial w}{\partial y} =$ 9x+9y+3z ✓

$\frac{\partial w}{\partial z} =$ 3x+9y+3z ✓

8. 2/2 points | Previous Answers | SCALCET8 14.3.051. | My Notes | Ask Your Teacher

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

(a) $z = f(x) + g(y)$

$\partial z/\partial x$	$\partial z/\partial y$
0	0
1	1
◉ $f'(x)$	$f'(x)$
$g'(y)$	◉ $g'(y)$
$f'(x) + g(y)$	$f'(x) + g(y)$
$f(x) + g'(y)$	$f(x) + g'(y)$
$f'(x) + g'(y)$	$f'(x) + g'(y)$
none of the above	none of the above

(b) $z = f(x + y)$

$\partial z/\partial x$	$\partial z/\partial y$
0	0
1	1
$f'(x)$	$f'(x)$
$f'(y)$	$f'(y)$
◉ $f'(x + y)$	◉ $f'(x + y)$
none of the above	none of the above

9. 2/2 points | Previous Answers | SCALCET8 14.3.053. | My Notes | Ask Your Teacher

Find all the second partial derivatives.

$f(x, y) = x^6y - 2x^5y^2$

$f_{xx}(x, y) =$ 30x4y−40x3y2

$f_{xy}(x, y) =$ 6x5−20x4y

$f_{yx}(x, y) =$ 6x5−20x4y

$f_{yy}(x, y) =$ −4x5

10. 2/2 points | Previous Answers | SCALCET8 14.3.056. | My Notes | Ask Your Teacher

Find all the second partial derivatives.

$T = e^{-2r}\cos(\theta)$

$T_{rr} =$ 4e−2rcos(θ)

$T_{r\theta} =$ 2e−2rsin(θ)

$T_{\theta r} =$ 2e−2rsin(θ)

$T_{\theta\theta} =$ −e−2rcos(θ)

11. 1/1 points | Previous Answers | SCALCET8 14.3.069. | My Notes | Ask Your Teacher

Find the indicated partial derivatives.

$w = \dfrac{x}{y + 4z}$

$\dfrac{\partial^3 w}{\partial z\,\partial y\,\partial x} =$ 8(y+4z)3

$\dfrac{\partial^3 w}{\partial x^2 \partial y} =$ 0

12. 1/1 points | Previous Answers | SCALCET8 14.3.083. | My Notes | Ask Your Teacher

The total resistance R produced by three conductors with resistances R_1, R_2, R_3 connected in a parallel electrical circuit is given by the formula

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}.$$

Find $\dfrac{\partial R}{\partial R_1}$.

$\dfrac{\partial R}{\partial R_1} =$ 1R21(1R1+1R2+1R3)2

13. 0/0 points | Previous Answers | SCALCET8 14.3.098. | My Notes | Ask Your Teacher

The paraboloid $z = 5 - x - x^2 - 2y^2$ intersects the plane $x = 2$ in a parabola. Find parametric equations in terms of t for the tangent line to this parabola at the point $(2, 3, -19)$. (Enter your answer as a comma-separated list of equations. Let x, y, and z be in terms of t.)

t,112(27−5t),1

14. –/0 points | SCALCET8 14.3.099. | My Notes | Ask Your Teacher

The ellipsoid $3x^2 + 5y^2 + z^2 = 96$ intersects the plane $y = 2$ in an ellipse. Find parametric equations for the tangent line to this ellipse at the point $(5, 2, 1)$. (Enter your answer as a comma-separated list of equations. Let x and y be in terms of t.)

15. 3/0 points | Previous Answers | SCALCET8 14.3.510.XP. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$u = 9xy\,\sin^{-1}(yz)$

$\dfrac{\partial u}{\partial x} =$ 9yarcsin(yz)

$\dfrac{\partial u}{\partial y} =$ 9xarcsin(yz)+9xy(z√1−z2y2)

$\dfrac{\partial u}{\partial z} =$ 9xy(y√1−y2z2)

16. 2/0 points | Previous Answers | SCALCET8 14.3.527.XP. | My Notes | Ask Your Teacher

Find the first partial derivatives of the function.

$f(x, y) = \int_y^x \cos(t^5)\,dt$

$f_x(x, y) =$ cos(x(5))

$f_y(x, y) =$ −cos(y5)

17. 0/1 points | Previous Answers | SCALCET8 14.4.001. | My Notes | Ask Your Teacher

Find an equation of the tangent plane to the given surface at the specified point.

$z = 4x^2 + y^2 - 9y, \quad (1, 4, -16)$

$z = -16 + 8x - y$

18. –/0 points | SCALCET8 14.4.011. | My Notes | Ask Your Teacher

Explain why the function is differentiable at the given point.

$f(x, y) = 9 + x \ln(xy - 5), \quad (3, 2)$

$f_x(x, y) =$

and $f_y(x, y) =$

The partial derivatives are , so $f_x(3, 2) =$ and $f_y(3, 2) =$. Both f_x and f_y are continuous functions for $xy >$ and f is differentiable at (3, 2).

Find the linearization $L(x, y)$ of $f(x, y)$ at (3, 2).

$L(x, y) =$

19. –/1 points | SCALCET8 14.4.501.XP.MI. | My Notes | Ask Your Teacher

Find an equation of the tangent plane to the given surface at the specified point.

$z = 4(x - 1)^2 + 6(y + 3)^2 + 6, \quad (2, -2, 16)$

20. –/1 points | SCALCET8 14.4.507.XP. | My Notes | Ask Your Teacher

Find an equation of the tangent plane to the given surface at the specified point.

$z = y \ln(x), \quad (1, 7, 0)$

21. –/1 points | SCALCET8 14.4.509.XP. | My Notes | Ask Your Teacher

Find the linear approximation of the function below at the indicated point.

$f(x, y) = \sqrt{41 - x^2 - 4y^2}$ at $(4, 2)$

$f(x, y) \approx$

Use this approximation to find $f(4.07, 2.05)$. (Round your answer to three decimal places.)

$f(4.07, 2.05) \approx$

22. 2/2 points | Previous Answers | SCALCET8 14.4.AE.001. | My Notes | Ask Your Teacher

Video Example

EXAMPLE 1 Find the tangent plane to the elliptic paraboloid $z = 2x^2 + 3y^2$ at the point (1, 1, 5).

SOLUTION Let $f(x, y) = 2x^2 + 3y^2$. Then

$f_x(x, y) =$ $4x$ $f_y(x, y) =$ $6y$

$f_x(1, 1) = 4$ $f_y(1, 1) = 6$

Then this equation gives the equation of the tangent plane at (1, 1, 5) as

$z - 5 = 4(x - 1) + 6(y - 1)$

or

$z = 4x + 6y - 5$.

23. –/2 points | SCALCET8 14.4.AE.002. | My Notes | Ask Your Teacher

Video Example

EXAMPLE 2 Show that $f(x, y) = 6xe^{xy}$ is differentiable at (1, 0) and find its linearization there. Then use it to approximate $f(1.1, -0.1)$.

SOLUTION The partial derivatives are

$f_x(x, y) =$ $f_y(x, y) =$

$f_x(1, 0) = 6$ $f_y(1, 0) = 6$.

Both f_x and f_y are continuous functions, so f is differentiable. The linearization is

$L(x, y) = f(1, 0) + f_x(1, 0)(x - 1) + f_y(1, 0)(y - 0)$

$= 6 + ($ $) + 6 \cdot y$

$=$.

The corresponding linear approximation is

$6xe^{xy} \approx$

so

$f(1.1, -0.1) \approx L(1.1, -0.1) =$.

Compare this with the actual value. (Round your answer to five decimal places.)

$f(1.1, -0.1) = 6.6e^{-0.11} \approx$

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