Question #1 Pick 1 questions, 0 pts per question

Question

(4 points) 1. For the following function, determine and sketch the domain: $f(x,y) = \ln(x+y-1)$

Question

(4 points) 1. For the following function, determine and sketch the domain: $f(x,y) = \ln(x-y+1)$

Question #2 Pick 1 questions, 0 pts per question

Question

(4 points) 2. Given $f(x,y) = 4x^2 + 16y^2$. Sketch the function's level curves for $k = 0,\ k = 4,\ k = 16$.

Question

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Question #3 Pick 1 questions, 0 pts per question

Question

(4 points) 3. Find the following limit: $\lim_{(x,y)\to(0,0)} \frac{x^8 - y^8}{x^4 - y^4}$

Question

(4 points) 3. Find the following limit: $\lim_{(x,y)\to(0,0)} \frac{x^4 + y^4}{x^8 - y^8}$

Question #4 Pick 1 questions, 0 pts per question

Question

(4 points) 4. Find the following limit: $\lim_{(x,y)\to(0,0)} \frac{\sqrt{x+y} - 5}{x + y - 25}$

Question

(4 points) 4. Find the following limit: $\lim_{(x,y)\to(0,0)} \frac{x+y-9}{\sqrt{x+y}-3}$

Question #5 Pick 1 questions, 0 pts per question

Question

(4 points) 5. Show that $\lim_{(x,y)\to(0,0)} \frac{x^8-y^4}{x^8+y^4}$ does not exits by using the two-paths approach.

Question #6 Pick 1 questions, 0 pts per question

Question

6. Given $f(x,y) = 3y^2 e^{x^2y^3}$.

(2 points) a. Find f_x

(2 points) b. Find f_y

(3 points) c. Find f_{xx}

(3 points) d. Find f_{xy}

(3 points) e. Find f_{yy}

Question

6. Given $f(x,y) = 4x^2 e^{x^3y^2}$.

(2 points) a. Find f_x

(2 points) b. Find f_y

(3 points) c. Find f_{xx}

(3 points) d. Find f_{xy}

(3 points) e. Find f_{yy}

Question #7 Pick 1 questions, 0 pts per question

Question

(4 points) 7. Given
$w = x^2 + y^2 z,\ x = 3s + t^2,\ y = 4s^2 + 2t,\ z = 5s - 3t$. Find $\frac{\partial w}{\partial s}$ and $\frac{\partial w}{\partial t}$.

Question

(4 points) 7. Given
$w = x^2 + yz^2,\ x = 3t + s^2,\ y = 5s + 4t^2,\ z = 4s - 6t$. Find $\frac{\partial w}{\partial s}$ and $\frac{\partial w}{\partial t}$.

Question #8 Pick 1 questions, 0 pts per question

Question

(4 points) 8. Use partial derivatives to perform implicit differentiation to find $\frac{dy}{dx}$ if $3x^2y^4 + \sin\left(x^3y^2\right) = 4y^3 + 2x^5$, where y is a

differentiable function of x.

Question

(4 points) 8. Use partial derivatives to perform implicit differentiation to find $\frac{dy}{dx}$ if $5x^3y^2 + \sin(x^4y^3) = 2y^4 + 3x^3$, where y is a differentiable function of x.

Question #9 Pick 1 questions, 0 pts per question

Question

9. Given $f(x,y) = \sqrt{xy}$.

(4 points) a. Find the linearization, $L(x,y)$, of the function at $(1,4)$.

(2 points) b. Use the linearization to approximate the function at the point $(0.8, 4.3)$.

Question #10 Pick 1 questions, 0 pts per question

Question

(4 points) 10. Find the directional derivative of $f(x,y,z) = x^2y + y^2z + xz^2$ at the point $(3,1,2)$ in the direction of the vector $\vec{v} = < 2, 2, -1 >$.

Question

(4 points) 10. Find the directional derivative of $f(x, y, z) = x^2y + y^2z + xz^2$ at the point $(2, 1, 3)$ in the direction of the vector $\vec{v} =< -1, 2, 2 >$.

Question #11 Pick 1 questions, 0 pts per question

Question

11. Given $x^2y^2z^3 = 16$ and the point $P_0(2, 2, 1)$.

(5 points) a. Find the equation of the tangent line at the point P_0.

(3 points) b. Find the equation of the normal line to the given surface at the point P_0.

Question #12 Pick 1 questions, 0 pts per question

Question

(7 points) 12. Given $f(x, y) = 2x^3 + 2y^3 - 9x^2 + 3y^2 - 12y$. Find the local maxima, local minima, and saddle points.

Question #13 Pick 1 questions, 0 pts per question

Question

(7 points) 13. Use Lagrange multipliers to determine the maximum and minimum values of $f(x, y, z) = x + 2y + 3z$ subject to the constraint $g(x, y, x) = x^2 + y^2 + z^2 = 25$.

Question #14 Pick 1 questions, 0 pts per question

Question

(7 points) 14. A cardboard box with out a top has a volume of 5324 cm^3. Find the dimensions that minimize the amount of cardboard that is used.

Question

(7 points) 14. A cardboard box with out a top has a volume of 8788 cm^3. Find the dimensions that minimize the amount of cardboard that is used.

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