

1. Evaluate the following limits if possible.

(a) $\lim_{(x,y) \rightarrow (0,0)} \frac{2x^2+7y^2}{4y^2+x^2}$

(b) $\lim_{(x,y) \rightarrow (0,0)} \frac{2x^4y}{x^8+6y^2}$

2. Verify that $f_{xy} = f_{yx}$ for the following functions.

(a) $f(x, y) = x^4y^{-2} - 4xy + e^{7y} + \ln(2x)$

(b) $f(x, y) = e^{xy} \sin(y)$

3. Given the following information use the Chain Rule to determine $\frac{\partial z}{\partial u}$ and $\frac{\partial z}{\partial v}$.

$$z = x \sin(y^2), x = 3u - v^2, y = u^6$$

4. Find and classify all the critical points of the function $f(x, y) = xye^{-8(x^2+y^2)}$.

5. Find the absolute minimum and maximum of $f(x, y) = 18x^2 + 4y^2 - y^3x - 2$ on the triangle with the vertices $(-1, -1)$, $(5, -1)$, and $(5, 17)$.

6. Find the maximum and minimum values of $f(x, y, z) = xyz$ subject to the constraint $x^2 + 2y^2 + 4z^2 = 24$