
1. Evaluate the limit $\lim_{(x,y) \rightarrow (0,0)} \frac{x^4 - y^2}{x^4 + y^2}$ if it exists. Otherwise prove that it doesn't exist

2. Let $z^3 - xy + yz + y^3 = 0$. Find $\frac{\partial z}{\partial x}$ at $(1, 1, 1)$

3. Let $w = \log(x^2 + y^2)$, $x = e^u \cos v$, $y = e^u \sin v$. Find $\frac{\partial w}{\partial v}$ at $(u, v) = (0, 0)$.

4. Let $F(x) = \int_1^{x^2} \arctan(x+t) dt$. Find $F'(1)$

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1. Let $f(x, y, z) = x^2 + 2y^2 + 3z^2$ and $g(x, y, z) = xyz - 1$. Find the line tangent to the curve of the intersection of the surfaces $f(x, y, z) = 6$ and $g(x, y, z) = 0$