

Multivariable Calculus

Practice Exam 2

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1. Find the relative extrema and saddle points for $f(x, y) = x^3 - 3xy + y^3$.
2. Find three positive numbers x , y , and z , whose sum is 32 and for which $P = xy^2z$ is a maximum.
3. If $f(x, y, z) = xy + z$, find the directional derivative at $(2, 1, 1)$ in the direction $\langle 2, 1, 2 \rangle$.
4. Find $\frac{\partial w}{\partial x}$, $\frac{\partial w}{\partial y}$, and $\frac{\partial w}{\partial z}$ for $x^2 + y^2 + z^2 + 6xw - 8w^2 = 5$.
5. Find the maximum and minimum values of $f(x, y) = x^2 - y^2$, subject to the constraint $y - x^2 = 0$.
6. Find the plane tangent to $x^2y^3 - 2xy + xyz = 5$ at the point $(1, 1, 6)$.