

Sample Exam II

1. Let $F(x, y) = x^2 + 2xy + y^4$. Evaluate the directional derivative at $(1, 2)$ in the direction of the vector $\langle -3, -4 \rangle$.
2. Let $z^2 - 2zxy + y^3 + x^4 = 5$. Find $\partial z / \partial x$ at $(x, y, z) = (-1, 1, 1)$.
3. Find and classify the critical point(s) of $f(x, y) = x^3y + 12x^2 - 8y$
4. Use Lagrange multipliers to find the minimum value of xy subject to $x^2 + y^2 = 1$,

5. Evaluate

$$\iint_R y^3 dA$$

in the region, R defined by the triangle formed by the intersection of the y -axis, the line $y = 2x$ and the line $y = 3 - x$.

6. Find the area of the surface defined by $\langle x, y, z \rangle = \langle u + v, 2v, -3u \rangle$ where $0 \leq u \leq 1$ and $-1 \leq v \leq 1$.