

3. Find and classify the critical points of $f(x, y) = x^3 + y^2 - 6xy + 9x + 5y + 2$.

4. Suppose p_1 and p_2 are the prices of two products. Also suppose $D_1(p_1, p_2) = 3000 + \frac{400}{p_1 + 3} + 50p_2$ and $D_2(p_1, p_2) = 2000 - 100p_1 + \frac{500}{p_2 + 4}$ are the demand functions for the two products (quantities). Are these two products competitive, complementary, or neither? (show work!) Give an example of two products that might behave in this way.

5. Using four rectangles, *estimate* the area between the curve $f(x) = x^2$ and the x -axis between $x = 1$ and $x = 3$.

6. Calculate $\int_1^{\infty} \frac{1}{x^2} dx$.

7. Suppose $z = x^2 + 2xy^2 + \frac{2y}{3x}$. Compute all four second-order partial derivatives (be sure to do each one separately).