

Math 32 A: Practice Midterm 2

1. Shade the region of the xy plane representing the domain of the following functions?

a. $f(x, y) = \ln(x^2 + y^2 - 25)$

b. $f(x, y) = \sqrt{\ln(x - y)}$

2. Let $f(x) = \begin{cases} 3x + 2 & \text{if } x \leq 2 \\ 4x & \text{if } x > 2 \end{cases}$.

Show that for all $\epsilon > 0$, there is a $\delta > 0$ such that $|f(x) - 8| < \epsilon$, if $|x - 2| < \delta$.

3. The kinetic energy of a body with mass m and velocity v is

$$K(m, v) = \frac{1}{2}mv^2.$$

Show that

$$\frac{\partial K}{\partial m} \frac{\partial^2 K}{\partial v^2} = K(m, v).$$

4. Use implicit differentiation of find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ where

$$\sin(xyz) = x + 2y + 3z$$

5. Is $f(x, y) = \sqrt{x + e^{4y}}$ differentiable at the point $(3, 0)$? If so, find the linearization of f at $(3, 0)$.