

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider the function $f(x, y) = \sqrt{y-x} \ln(x - y^2)$.

(a) The domain of f is

$$\mathcal{D} = \{(x, y) \in \mathbb{R}^2 : \quad \quad \quad \}.$$

(b) Sketch the graph of \mathcal{D} on the xy -plane.

2. Show that $\lim_{(x,y) \rightarrow (1,0)} \frac{x-1}{x^2+y^2-1}$ does not exist.

3. Consider $f(x, y) = e^{-3x^2 - 5y^2}$. Compute the following:

- $\frac{\partial f}{\partial x} =$

- $\frac{\partial^2 f}{\partial y \partial x} =$

4. Find an equation for the tangent plane to the graph of the function $f(x, y) = \sin(xy)$ at $(a, b) = (\frac{\pi}{6}, 1)$.