1. For \( f(x, y) = \sqrt{x} + \sqrt{y} + \ln (9 - x^2 - y^2) \), find:

   (a) Domain of \( f(x, y) \) and its sketch.

   (b) Level curve of \( f(x, y) \) that passes through \((2, 2)\).

2. Check whether or not \( \lim_{(x,y)\to(0,0)} \frac{x^2y}{x^4 + y^2} \) exists. Justify your answer.
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1. For \( f(x, y, z) = \ln \left( 16 - 4x^2 - 4y^2 - z^2 \right) \), find and sketch domain of \( f \).

2. Determine set of points at which \( f(x, y) = \frac{e^x + e^y}{e^{xy} - 1} \) is continuous.

3. If \( x - z + 1 = \tan^{-1}(yz) \), then find \( \frac{\partial z}{\partial x} \bigg|_{(\frac{\pi}{4},1,1)} \).
1. For $f(x, y) = \sqrt{1 - x^2 + y^2}$, find and sketch domain of $f$.

2. Evaluate: $\lim_{(x,y) \to (0,0)} \frac{x^2 - y^2}{\sqrt{x^2 + y^2}}$.

3. For $F(x, y) = x \cos y + \sin(xy)$, find $F_{xy}(1, \frac{\pi}{2})$. 
1. Find and sketch domain of \( f(x, y) = 4 \ln (3 - 2x^2 - y^2) \). Also find level curve of \( f(x, y) \) that passes through \((1, 0)\).

2. For \( z = \frac{x^2 + y^2}{x + y} \), find \( x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} \).