1. Find and sketch the domain of the function.

\[ f(x, y) = \sqrt{16 - 4x^2 - y^2} + \ln(x^2 + y^2 - 1) \]

2. Explain why this limit does not exist.

\[ \lim_{{(x, y) \to (0, 0)}} \frac{4x^2 + 3xy^3}{x^2 + y^2} \]