1. Change each of the following equations to rectangular coordinates.
   (a) \( z = r^2 \cos 2\theta \).
   
   (b) \( \rho^2 \sin \phi \cos \phi \cos \theta = 3 \)

2. Find and sketch the domain of the function: \( f(x, y) = \ln(y/x) \). What is the range of \( f \)?
3. For each of the following limits, either find its value or explain why it does not exist.

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

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

4. Determine the set of points at which the function \( f(x, y) = \frac{x^2 y}{\sqrt{25 - x^2 - y^2}} \) is continuous.

Find also \( f_y(3,0) \).