

- a)  $f(x, y) = \ln x^2 + y^2$                       b)  $x^2 + y^2 + z^2 = 0$   
c)  $x^2 + y^2 + 10z = 0$                       d)  $\sin xy = z^2$

2. Determine and sketch the domain of definition of the following functions:

- a)  $z = \sqrt{\frac{x+y}{x-y}}$                       b)  $z = \ln |x^2 - y^2| + \ln xy$

3. Same question for:

- a)  $z = \arcsin xy$                       b)  $z = \operatorname{arcsech}(\frac{x}{y})$

4. Same question for:

- a)  $z = \operatorname{argch}(\frac{x}{y})$                       b)  $z = (x^2 + y - 1)^{x/y}$

5. Determine and sketch the domain of the following functions:

- a)  $u = \sqrt{1 - \frac{x^2}{4} - \frac{y^2}{9} - \frac{z^2}{16}}$                       b)  $x = \ln xy + 9^{\sqrt{z-x}}$

6. Same question for:

- a)  $v = \arcsin \frac{x+y+z}{3}$                       b)  $v = (\tanh(z - x^2 - y^2))^{\frac{x+z}{y}}$

7. Evaluate the following limits of the given functions

- a)  $f(x, y) = \frac{x^2 - y}{x + y}$  at  $(0, 0)$  along  $y = x^3$   
b)  $f(x, y) = \frac{xy}{x + y - 1}$  at  $(0, 1)$  along  $y = x^2 + 1$

8. Same question for the function:

- a)  $f(x, y, z) = \frac{xe^{y+z}}{ye^{x-z}}$  at  $(0, 0, \ln 2)$  along  $r(t) = (t, 2t, \ln t + 2)$   
b)  $f(x, y, z) = \frac{x \cos y \sin t}{y \sin x \cos z}$  at  $(0, \pi/2, \pi/3)$  along  $r(t) = (t, \frac{\pi}{2} + t, \frac{\pi}{3} + t)$

9. Evaluate the iterated limits:

- a)  $\lim_{y \rightarrow 0} (\lim_{x \rightarrow 0} \frac{x+y}{x-y})$                       b)  $\lim_{x \rightarrow 0} (\lim_{y \rightarrow 0} \frac{x+y}{x-y})$