$$f(x, y) = x^2 + y^2$$

$$\lim_{\vec{x} \to \vec{0}} f(x, y) = 0$$

$\epsilon > 0$

$\delta > 0$

$$||\vec{x} - \vec{0}|| < \delta \implies |f(x, y) - (0)| < \epsilon$$

$$||\vec{x} - \vec{0}|| = ||\vec{x}|| = \sqrt{x^2 + y^2} < \delta$$

$$\delta = \sqrt{\epsilon}$$

$$\sqrt{x^2+y^2} < \delta = \sqrt{\epsilon} \implies |x^2+y^2| = |f(x,y)-0| < \epsilon$$

$$\lim_{\vec{x}\to\vec{0}} \frac{x^2 y}{x^2 + x^4} = \lim_{\vec{x}\to\vec{0}} \frac{\cancel{x^2} y}{(\cancel{x^2})(1 + x^2)} = \frac{0}{1+0} = 0$$

$$x = 0$$

$$y = 0$$

$$x = y$$

$$y = mx$$

$$y = mx^2$$

$$f(x, y) = \frac{x^2}{x^4 + y^2}$$

$$\lim_{(0,y)\to(0,0)} f(x,y) = \lim_{y\to 0} \frac{0}{0+y^2} = 0$$

$$\lim_{(x,0)\to(0,0)} f(x,y) = \lim_{x\to 0} \frac{x^2}{x^4+0} = \lim_{x\to 0} \frac{1}{x^2} = \infty$$

$$\lim_{(x,x)\to(0,0)} f(x,y) = \lim_{x\to 0} \frac{x^2}{x^4+x^2} = \lim_{x\to 0} \frac{1}{x^2+1} = 1$$

$$\lim_{(x,mx)\to(0,0)} f(x,y) = \lim_{x\to 0} \frac{x^2}{x^4+(mx)^2} = \lim_{x\to 0} \frac{1}{x^2+m} = \frac{1}{m}$$

$$\lim_{(x,mx^2)\to(0,0)} f(x,y) = \lim_{x\to 0} \frac{x^2}{x^4+(mx^2)^2} = \lim_{x\to 0} \frac{1}{x^2(1+m^2)} = \infty$$

$$\lim_{(0,y)\to(0,0)} f(x,y) \neq \lim_{(x,0)\to(0,0)} f(x,y) \neq \lim_{(x,x)\to(0,0)} f(x,y) \neq \lim_{(x,mx)\to(0,0)} f(x,y)$$

$$L_1 = \{\vec{x} \in \mathbb{R}^3 \ \ : \vec{x} = \vec{u}t + \vec{a}\}$$

$$L_2 = \{\vec{x} \in \mathbb{R}^3 \ : \vec{x} = \vec{v}t + \vec{b}\}$$

$$\vec{w} = \vec{u} \times \vec{v}$$