

$$11111(x^2v) \rightarrow (1,2) \frac{x^2v}{4x^2-v}$$



$$\frac{12(3)}{4(1)2-3}$$

$$=$$

$$\frac{1(3)}{4-3}$$

$$=$$

$$\frac{3}{1}$$

$$=3$$

$$\sin(x, y) \rightarrow (\pi, 1) \quad \frac{\cos(xy)}{y^2 + 1}$$

$$\frac{\cos(\pi)(1)}{1^2 + 1}$$

$$=$$

$$\frac{\cos(\pi)}{1 + 1}$$

$$=$$

$$\frac{-1}{2}$$

$$=$$

$$-\frac{1}{2}$$

$$11111(x,y) \rightarrow (0,0) \quad \frac{3x^2}{x^2+y^2}$$

$$3(0)^2$$



$$(0)^2 + (0)^2$$



$$0$$



$$0$$

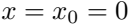


$$\lim_{v \rightarrow (0,0)} \frac{3v^2}{v^2 + v^2} = 0$$



$$1111(v,v) \rightarrow (v,0) \quad \frac{3v^2}{v^2+v^2} = \frac{3}{2}$$

$$\lim_{(x,y) \rightarrow (0,0)} \frac{y \sin x}{x^2 + y^2}$$



$$\lim_{(0,y) \rightarrow (0,0)} \frac{y \sin 0}{0 + y^2} = \lim_{y \rightarrow 0} 0 = 0$$

$$\lim_{(x,x) \rightarrow (0,0)} \frac{x \sin x}{x^2 + x^2} = \lim_{x \rightarrow 0} \frac{\sin x}{2x} = \lim_{x \rightarrow 0} \frac{\cos x}{2} = \frac{1}{2}$$

$$\frac{(x, y) \rightarrow (1, 2) \quad \begin{array}{|c|} \hline 1 \\ \hline \end{array}}{xy - 2x - y + 2 \quad \hline \quad x^2 - 2x + y^2 - 4y + 5}$$

$$\lim_{(x,y) \rightarrow (1,2)} \frac{xy - 2x - y + 2}{x^2 - 2x + y^2 - 4y + 5} = \lim_{(x,y) \rightarrow (1,2)} \frac{(x(y-2) - (y-2))}{x^2 - 2x + 1 + y^2 - 4y + 4} = \lim_{(x,y) \rightarrow (1,2)} \frac{(x-1)(y-2)}{(x-1)^2 + (y-2)^2}$$





123456789

$$\lim_{(x,y) \rightarrow (1,2)} \frac{(x-1)(y-2)}{(x-1)^2 + (y-2)^2} = \lim_{(x',y') \rightarrow (0,0)} \frac{x'y'}{x'^2 + y'^2}$$



$$\lim_{(0,y') \rightarrow (0,0)} \frac{(0)y'}{0+y'^2} = \lim_{(0,y') \rightarrow (0,0)} 0 = 0$$



$$(x', x') \rightarrow (0, 0) \quad \frac{x'^2}{x'^2 + x'^2} = \lim_{x' \rightarrow 0} \frac{1}{2} = \frac{1}{2}$$

$$\lim_{(x,y,z)\rightarrow(0,0,0)} \frac{3x^2}{x^2+y^2+z^2}$$

$$\lim_{(0,y,z)\rightarrow(0,0,0)} \frac{0}{0+y^2+z^2} = \lim_{(y,z)\rightarrow(0,0)} 0 = 0$$



$$\lim_{(x,x,x)\rightarrow(0,0,0)} \frac{3x^2}{x^2+x^2+x^2} = \lim_{x\rightarrow 0} 1 = 1$$

$$(x, y, z) \rightarrow (0, 0, 0) \quad \frac{xyz}{x^3 + y^3 + z^3}$$

$$\lim_{(0,y,z)\rightarrow(0,0,0)} \frac{(0)yz}{(0)^3+y^3+z^3} = \lim_{(y,z)\rightarrow(0,0)} 0 = 0$$

$$\lim_{(x,x,x)\rightarrow(0,0,0)} \frac{x^3}{x^3+x^3+x^3} = \lim_{x\rightarrow 0} \frac{1}{3} = \frac{1}{3}$$