

$f(x, y) = y^4/(x^4 + 9y^4)$. First approach $(0, 0)$ along the x -axis. Then $f(x, 0) = 0/x^4 = 0$ for $x \neq 0$, so $f(x, y) \rightarrow 0$. Now approach $(0, 0)$ along the y -axis. Then for $y \neq 0$, $f(0, y) = y^4/9y^4 = 1/9$, so $f(x, y) \rightarrow 1/9$. Since f has two different limits along two different lines, the limit does not exist.