

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

for option (a) & (b)

Check partial derivatives at (0,0)

$$f_x(0,0) = \lim_{h \rightarrow 0} \frac{f(h,0) - f(0,0)}{h} = \lim_{h \rightarrow 0} \frac{h^2}{h^4 + h^2} = \lim_{h \rightarrow 0} \frac{1}{h^2 + 1} = \frac{1}{0+1} = 1$$

not exist

$\Rightarrow$ $f_x(0,0)$ not exist

$\Rightarrow$ option (B) is correct
option (A) is incorrect

for option (c) & (d)

$$\text{let } y = mx^2$$

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

not continuous at (0,0)