

(15) (a) $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y}{x^4 + y^2}$ does not exist since

approaching $(0,0)$ along the parabolas $y = mx^2$,

we get $\lim_{x \rightarrow 0} \left(\frac{x^2 y}{x^4 + y^2} \Big|_{y=mx^2} \right) = \lim_{x \rightarrow 0} \frac{m^2}{1+m^2} = \frac{m^2}{1+m^2}$
↑
depends on m !

(c) $\lim_{(x,y) \rightarrow (-1,1)} \frac{x^2 e^{y(x+1)} - \cos(-\pi x)}{x^3 + xy^2} = -1$
continuous at $(-1,1)$

(d) $\lim_{(x,y) \rightarrow (0,0)} yx \cos\left(\frac{1}{x}\right) = 0$ since

$$-yx \leq yx \cos\left(\frac{1}{x}\right) \leq yx \quad \text{and}$$

$$\lim_{(x,y) \rightarrow (0,0)} (yx) = \lim_{(x,y) \rightarrow (0,0)} (-yx) = 0$$