$$\lim_{(x,y)\to(0,0)} \frac{8y^7}{x^8+6y^8}$$

$$\lim_{(x,y)\to(0,0)} \frac{x^2y^6}{x^8+6x^2y^5}$$

$$\lim_{(x,y)\to(0,0)} \frac{x^2y^4}{x^{10}+y^5}$$

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

$$\lim_{(x,y)\to(1,0)} \frac{(x-1)^2 \ln(x)}{(x-1)^2+y^2}$$

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

# Examples of continuous functions in 2D

1. Polynomials

$$\sum_{i=0}^{n} \sum_{j=0}^{m} a_{ij} x^i y^j \qquad D = \mathbb{R}^2.$$

2. Rational Functions

$$f(x,y) = \frac{g(x,y)}{h(x,y)}$$ where $g$ and $h$ are both polynomial functions, $h \neq 0$

$$D = \{(x,y) \in \mathbb{R}^2 \mid h(x,y) \neq 0\}$$

3. $$f(x,y) = \begin{cases} \dfrac{3x^2y}{x^2+y^2} & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0) \end{cases}$$

$$\lim_{(x,y)\to(0,0)} \frac{3x^2y}{x^2+y^2} \overset{\text{shown earlier}}{=} 0 = f(0,0)$$