

# Quiz 2 MTH 428/528 Spring 2025

Sunday, February 9, 2025

1:19 PM

Consider

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

points look like

$(x,0)$

The limit DNE because

① along line determined by  $e_1$  (i.e. along  $x$ -axis) it becomes

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

② along line  $e_1 + e_2$  (i.e. along line  $y=x$ )

it becomes

$$\lim_{(x,x) \rightarrow (0,0)} \frac{x^4}{x^4 + 0^2} = \lim_{x \rightarrow 0} 1 = 1$$

points look like  $(x,x)$

limits disagree

$\Rightarrow$  limit DNE