201 §2.1

Does $f'(0)$ ∃?

B1

$$f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$

$$\frac{(0+h)\sin\left(\frac{1}{h}\right) - 0}{h} = \frac{h \sin\left(\frac{1}{h}\right)}{h} \to ?$$

$$= \sin\left(\frac{1}{h}\right) \xrightarrow{h \to 0} \nexists$$

B2

$$\frac{(0+h)^2 \sin\left(\frac{1}{h}\right) - 0}{h}$$

$$= \frac{h^2 \sin\left(\frac{1}{h}\right)}{h} = h \sin\left(\frac{1}{h}\right) \xrightarrow{h \to 0} 0$$

∃!