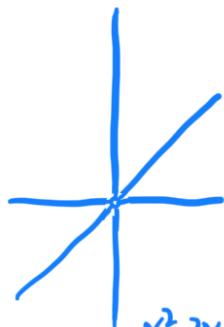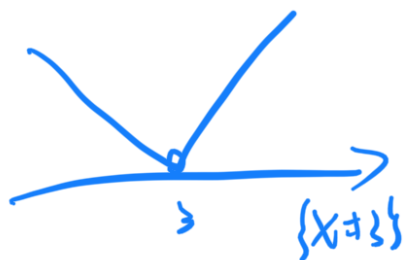ex 2

$$\lim_{x \to 0} \frac{x^2}{x} = 0$$

$$D\left(\frac{x^2}{x}\right) = \{x \neq 0\}, \quad R\left(\frac{x^2}{x}\right) = \{y \neq 0\}$$

ex 3. $\lim_{x \to 2} \frac{x^2 - 3x + 2}{x - 2} = \lim_{x \to 2} \frac{(x-2)(x-1)}{x-2} = 1$

ex 4. $\lim_{t \to 0} H(t)$, $H(t) = \begin{cases} 0, & t \leq 0 \\ 1, & t > 0 \end{cases}$, $\lim_{t \to 0^-} H(t) = 0$, $\lim_{t \to 0^+} H(t) = 1$, $\lim_{t \to 0^-} H(t) \neq \lim_{t \to 0^+} H(t)$

$\lim_{t \to 0} H(t)$ DNE

ex 6. $\lim_{x \to \infty} \frac{x^2 + 6x + 12}{3x^2 + 8x - 10} = \lim_{x \to \infty} \frac{1 + \frac{6}{x} + \frac{12}{x^2}}{3 + \frac{8}{x} - \frac{10}{x^2}} = \frac{1}{3}$

多项式相除，分子高阶：$x \to \infty$, $f(x) \to \infty$ ；分母高阶：$x \to \infty$, $f(x) \to 0$ ；同阶：系数相除

$f(x) = |x|$ $f'(0)$ DNE

continuous $\longleftrightarrow$ differentiable

differentiable (no sharp corners to jump)

e.g. $f(x) = x^{5.2}$, $f'(x) = 5.2x^{4.2}$

$g(t) = \frac{1}{t}$, $g'(t) = -\frac{1}{t^2}$

position function $p(t)$

velocity function $v(t) = p'(t)$

acceleration function $a(t) = v'(t) = p''(t)$