> *Limit*

$\lim\limits_{x \to 2} f(x) = 1$ "the limit, as x goes to 2, of $f(x)$ is equal to 1.

\# $f(x) \to 1$, as $x \to 2$.

\# left hand and right hand limit.

$\lim\limits_{x \to 3^-} h(x)$ 左极限. $\lim\limits_{x \to 3^+} h(x)$ 右极限.

\# 当 $x=a$ 的左、右极限存在且相等, 这一点的极限存在。

即 $\lim\limits_{x \to a^-} f(x) = L$ and $\lim\limits_{x \to a^+} f(x) = L$, $\lim\limits_{x \to a} f(x) = L$. 如果不等, $\lim\limits_{x \to a} f(x)$ DNE (不存在).

$\lim\limits_{x \to a} x$ 可以不存在, 左、右极限也可不存在。

\# Sandwich principle or squeeze principle.

for all x near a, $g(x) \le f(x) \le h(x)$, 且 $\lim\limits_{x \to a} g(x) = \lim\limits_{x \to a} h(x) = L$, 则 $\lim\limits_{x \to a} f(x) = L$.

eg: 求 $\lim\limits_{x \to 0} x \sin(\frac{1}{x})$. $-1 \le \sin(\frac{1}{x}) \le 1$. $-x \le \sin(\frac{1}{x}) \le x$, $\lim\limits_{x \to 0^-} x = \lim\limits_{x \to 0^+} x = 0$, 则 $\lim\limits_{x \to 0^+} x \sin(\frac{1}{x}) = 0$.

> limit involved with polynomials.

\# $\lim\limits_{x \to a} \dfrac{P(x)}{q(x)}$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$. when x is large, the leading term dominates.

\# poly-type function   eg: $\lim\limits_{x \to \infty} \dfrac{\sqrt{16x^8 + 8} + 3x}{2x^4 + 6x + 1}$