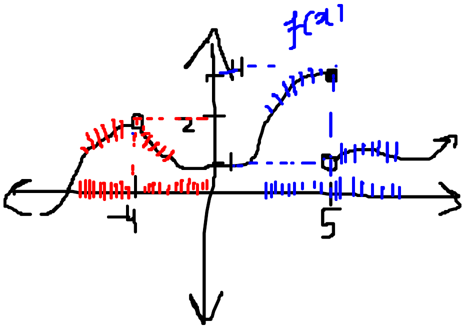
# FIND LIMIT WITH GRAPH




$\boxed{\lim_{x \to -4} f(x) = 2}$

$\lim_{x \to -4^+} f(x) = 2$

$\lim_{x \to -4^-} f(x) = 2$

$f(-4) =$ not defined

$\lim_{x \to 5} f(x) =$ DNE

$\lim_{x \to 5^+} f(x) = 1$

$\lim_{x \to 5^-} f(x) = 4 = L$

$f(5) = 4$

**2.** Use the graphs of $f$ and $g$ in the accompanying figure to find the limits that exist. If the limit does not exist, explain why.

(a) $\lim_{x \to 2} [f(x) + g(x)] = 0$

$\lim_{x \to 2} f(x) + \lim_{x \to 2} g(x) = 0 + 0$

(b) $\lim_{x \to 0} [f(x) + g(x)]$ DNE

(c) $\lim_{x \to 0^+} [f(x) + g(x)] = 0$

$-2 + 2$

(d) $\lim_{x \to 0^-} [f(x) + g(x)]$

$1 + 2 = 3$

(e) $\lim_{x \to 2} \dfrac{f(x)}{1 + g(x)} = \dfrac{\lim_{x \to 2} f(x)}{1 + \lim_{x \to 2} g(x)} = \dfrac{0}{1 + 0} = 0$

(f) $\lim_{x \to 2} \dfrac{1 + g(x)}{f(x)} = \dfrac{1 + 0}{0} = \dfrac{1}{0} = \infty$

(g) $\lim_{x \to 0^+} \sqrt{f(x)} = \left(\lim_{x \to 0^+} f(x)\right)^{1/2} = \boxed{(-2)^{1/2}} =$ ND

(h) $\lim_{x \to 0^-} \sqrt{f(x)} = \left(\lim_{x \to 0^-} f(x)\right)^{1/2} = (1)^{1/2} = 1$

$\lim_{x \to 0} f(x) + \lim_{x \to 0} g(x)$

$\sqrt{f(x)}$

$f(x)$

$\lim_{x \to 2^-} f(x) = 0$

$\lim_{x \to 2^+} f(x) = 0$

$\lim_{x \to 2^+} g(x) = 0$

$\lim_{x \to 2^-} g(x) = 0$

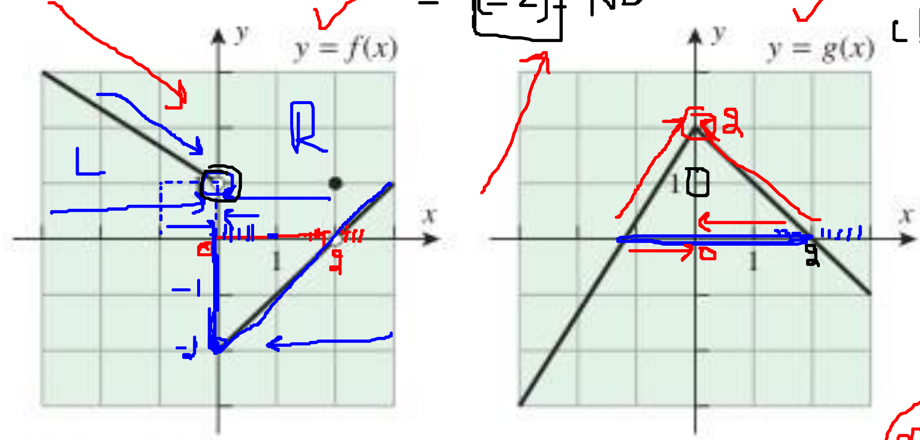
$\lim_{x \to 0^+} f(x) = -2 = L$

$\lim_{x \to 0^-} f(x) = 1 = L$

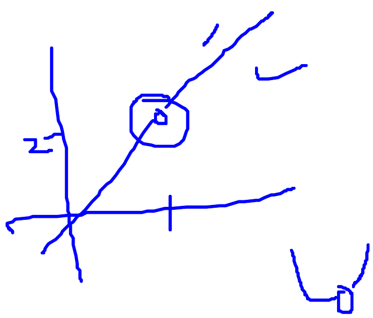
$\lim_{x \to 0^-} g(x) = 2 = L$

$\lim_{x \to 0^+} g(x) = 2 = L$

$\infty$, DNE $\pm$ c



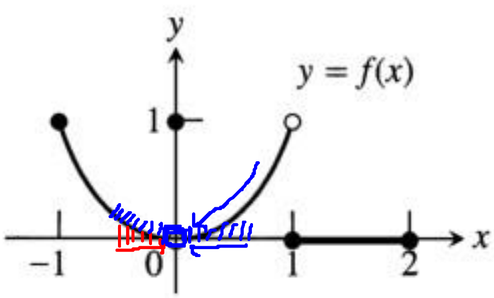

▲ **Figure Ex-2**




$$\boxed{\lim_{x \to 0} f(x) = 0}$$

$$\lim_{x \to 0^+} f(x) = 0 = L$$

$$\lim_{x \to 0^-} f(x) = 0 = L$$



piecewise funcs.

**3.** Let $f(x) = \begin{cases} 3 - x, & \boxed{x < 2} \quad L \quad \lim_{x \to 2^-} \\ \dfrac{x}{2} + 1, & \boxed{x > 2} \quad R \quad \lim_{x \to 2^+} \end{cases}$

$\lim_{x \to 2} f(x) = \text{DNE}$

$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} 3 - x$

$= (3) - 2$

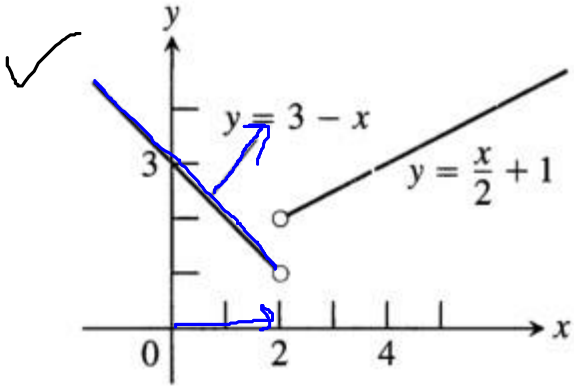
$= 1 \text{ (exist)}$

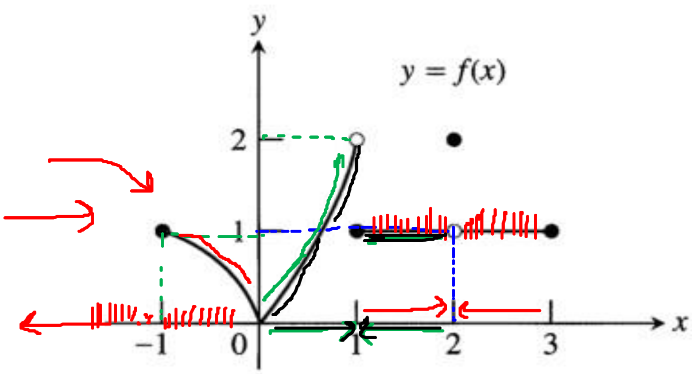
$\lim_{x \to 2^+} f(x) = \lim_{x \to 2^+} \left(\frac{x}{2} + 1\right)$

$= \frac{2}{2} + 1$

$= 1 + 1 = 2 \text{ (exists)}$

$L \neq R$




(a) $\lim_{x \to 2} f(x) = 1$

Sol:-

$\lim_{x \to 2^+} f(x) = \lim_{x \to 2^-} f(x)$

$1 = 1$

(b) $\lim_{x \to -1} f(x) = \text{DNE}$

Sol:- $\lim_{x \to -1^+} f(x) = \lim_{x \to -1^-} f(x)$

$1 \neq \text{DNE}$

(c) $\lim_{x \to 1} f(x) = \text{DNE}$

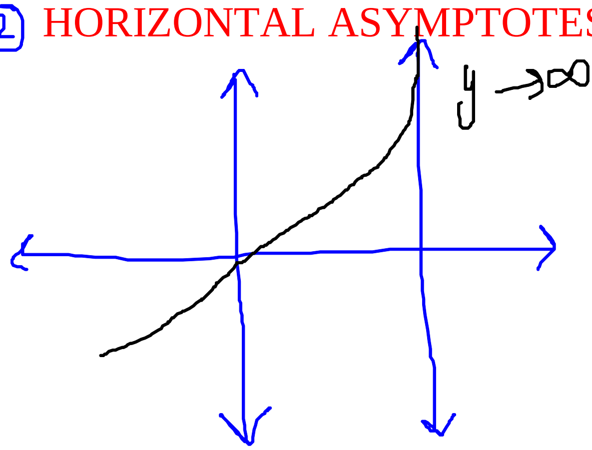
$\lim_{x \to 1^-} f(x) = \lim_{x \to 1^+} f(x)$

$2 \neq 1$

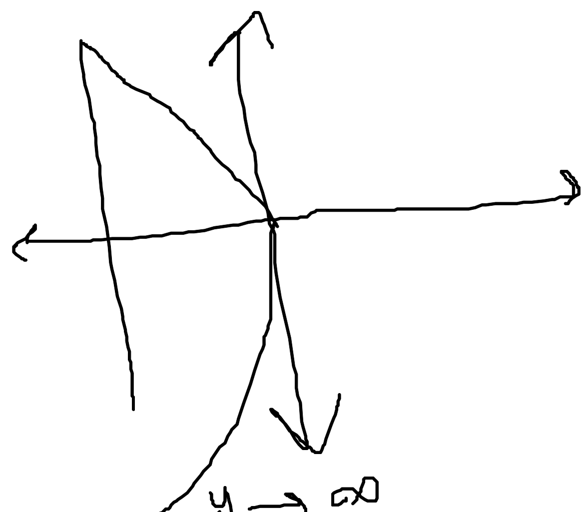
# INFINITE LIMITS

1. VERTICAL ASYMPTOTES $y =$
2. HORIZONTAL ASYMPTOTES $x =$

1

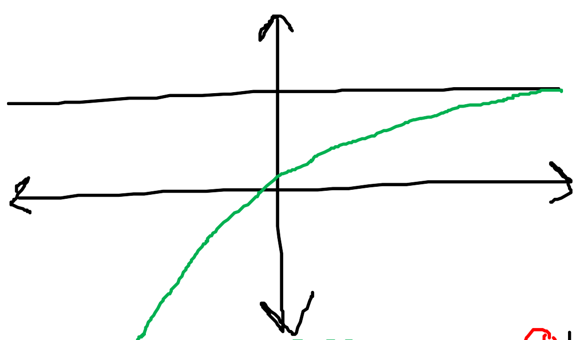


$y \to \infty$

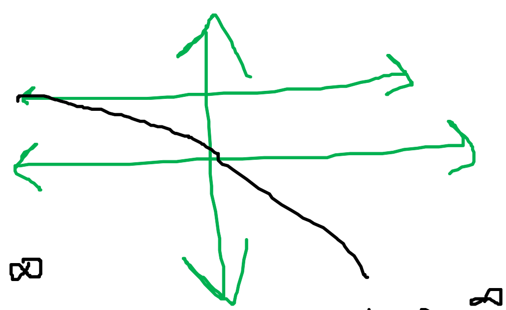


$y \to -\infty$

2



$x \to \infty$

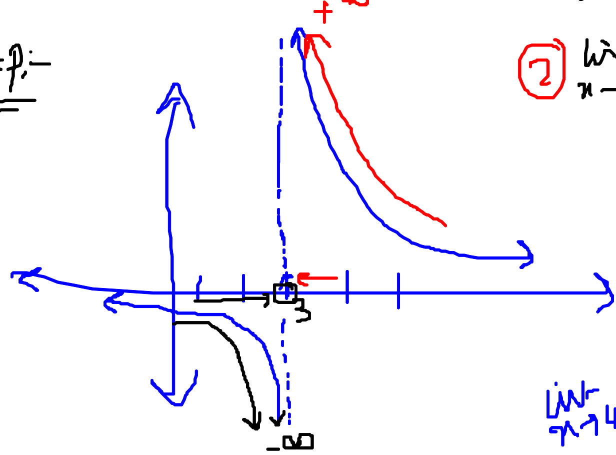


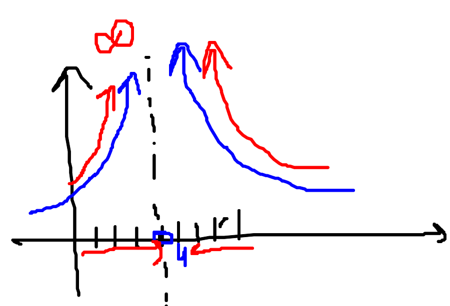
$x \to -\infty$

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

$\lim_{x \to 3} f(x) = \text{DNE}$

Exp:-




$\lim_{x \to 4} f(x) = \infty$ (DNE)

$\lim_{x \to 4^-} f(x) = +\infty$

$\lim_{x \to 4^+} f(x) = +\infty$