Asymptotes

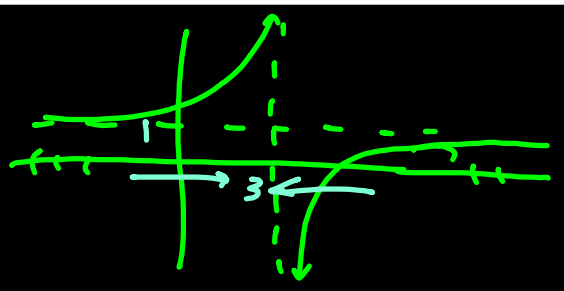
Vertical

$\lim_{x \to \#} f(x) = \pm\infty$

↑ Denom = 0

Horizontal

$\lim_{x \to \pm\infty} f(x) = \#$



$f(x) = \frac{1}{x-3} + 1 \quad (x-3)$

$\frac{1}{1(x-3)} \quad \frac{1 + x - 3}{x-3}$

$= \frac{x-2}{x-3}$

$$f(x) = \frac{x^2 - 2x}{x^2 + x - 6} = \frac{}{(x+3)(x-2)}$$

Horiz

$$\lim_{x \to \infty} \frac{x^2}{x^2} = 1$$

$y = 1$

Vertical

$$\lim_{x \to 2} \frac{x^2 - 2x}{(x+3)(x-2)} = \frac{0}{0}$$

$$\lim_{x \to 2} \frac{x(x-2)}{(x+3)(x-2)} = \frac{2}{5}$$

No vert. at $x = 2$

$$\lim_{x \to -3^-} \frac{x}{x+3} = \frac{-3}{0} = \frac{}{-} = +\infty$$

tested -3.1

Vert. at $x = -3$

$$f(x) = \frac{\sqrt{36x^2+11}}{3x-5}$$

Vertical

$$\lim_{x \to 5/3^+} \frac{\sqrt{36x^2+11}}{3x-5} = \frac{\#}{0}$$

$$= \frac{+}{+} = +\infty$$

$x = 5/3$

Horiz

$$\lim_{x \to +\infty} \frac{\sqrt{36x^2}}{3x} = \lim_{x \to \infty} \frac{6|x|}{3x}$$

$$= \lim_{x \to \infty} \frac{6x}{3x} = 2$$

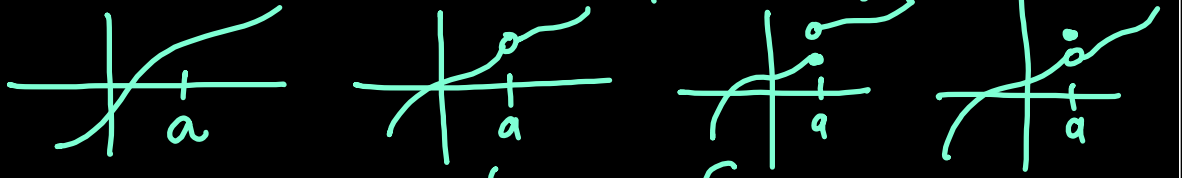
$$\lim_{x \to -\infty} \frac{6|x|}{3x} = \lim_{x \to -\infty} \frac{-6x}{3x}$$

$$= -2$$

$y = 2$ & $y = -2$

CONTINUITY = Unbroken

no holes, no vert. asymp



1) $f(a)$ is defined.
2) $\lim_{x \to a} f(x)$ exists.
3) $f(a) = \lim_{x \to a} f(x)$

$$f(x) = \begin{cases} 3x+2 & x < 1 \\ 7-2x^2 & x \geq 1 \end{cases} \quad a = 1$$

1) $f(1) = 7 - 2(1)^2 = 5$
2) $\lim_{x \to 1^-} 3x+2 = 5$

$\lim_{x \to 1^+} 7-2x^2 = 5$

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

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

Yes, $f(x)$ is continuous at $a = 1$

$$f(x)=\begin{cases} 3x+8 & x<-3 \\ 4 & x=-3 \\ x^2-10 & x>-3 \end{cases} \quad a=-3$$

1) $f(-3)=4$

2) $\lim_{x\to -3^-} 3x+8=-1$

$\lim_{x\to -3^+} x^2-10=-1$

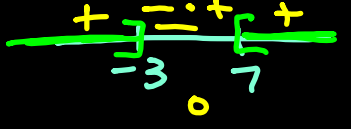
$\lim_{x\to -3} f(x)=-1$

3) $f(-3)\neq \lim_{x\to -3} f(x)$

Not continuous

$$f(x)=\sqrt{x^2-9x-21}$$

$(x-7)(x+3)$



$(-\infty,-3]$ C

$(7,\infty)$ C

$(-\infty,7]$ D

$(-3,7)$ D