$$\lim_{x\to -2} \frac{x^2+x-2}{x^2+4x+4} = \frac{(-2)^2+(-2)-2}{(-2)^2+4(-2)+4} = \frac{4-2-2}{4-8+4} = \left(\frac{0}{0}\right) =$$

$$\begin{array}{r|rrr} & 1 & 1 & -2 \\ -2 & & -2 & 2 \\ \hline & 1 & -1 & \boxed{0} \end{array} \qquad \begin{array}{r|rrr} & 1 & 4 & 4 \\ -2 & & -2 & -4 \\ \hline & 1 & 2 & \boxed{0} \end{array}$$

$$= \lim_{x\to -2} \frac{(x+2)(x-1)}{(x+2)(x+2)} = \lim_{x\to -2} \frac{x-1}{x+2} = \frac{-3}{0} = \infty$$

Determinemos, si es posible, el signo del ∞

$$\lim_{x\to -2^-} \frac{x-1}{x+2} \overset{x=-2'1}{=} \frac{-}{-}\infty = +\infty$$

$$\lim_{x\to -2^+} \frac{x-1}{x+2} \underset{x=-1'9}{=} \frac{-}{+}\infty = -\infty$$

$$\lim_{x\to 5} \frac{x^2+x-30}{x^2+3x-24} = \frac{25+5-30}{25+15-24} = \frac{0}{16} = 0$$

$$\lim_{x\to -3} \frac{x^2+3x}{x+3} = \frac{9-9}{-3+3} = \left(\frac{0}{0}\right) = \lim_{x\to -3} \frac{x\cancel{(x+3)}}{\cancel{(x+3)}} = \lim_{x\to -3} x = -3$$

$$\lim_{x\to 3} \left(3 - \sqrt{x^2-2x+1}\right) = 3 - \sqrt{9-6+1} = 3-\sqrt{4} = 3-2 = 1.$$

$$\lim_{x\to 1} \log\left(5x^3+4x+1\right) = \log(5+4+1) = \log 10 = 1$$

$$\lim_{x\to -\infty} (x^5 + x^4 - 3) = -\infty \quad (\text{manda } x^5)$$

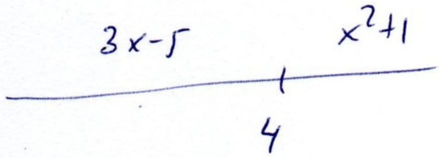
$$\lim_{x\to +\infty} (7x - 3x^3) = -\infty \quad (\text{manda } -3x^3)$$

$$\lim_{x\to -\infty} \frac{-4x^3 + x - 2}{x^2 + 4x + 4} = \left(\frac{\infty}{\infty}\right) = \lim_{x\to -\infty} \frac{-4x^3}{x^2} = \lim_{x\to -\infty} (-4x) = +\infty$$

$$\lim_{x\to -\infty} \frac{6x^2 + x - 30}{2x^2 + 3x - 24} = \left(\frac{\infty}{\infty}\right) = \lim_{x\to -\infty} \frac{6x^2}{2x^2} = \lim_{x\to -\infty} 3 = 3$$

$$\lim_{x\to +\infty} \frac{x-3}{2x^2 + 3x} = \left(\frac{\infty}{\infty}\right) = \lim_{x\to +\infty} \frac{x}{2x^2} = \lim_{x\to +\infty} \frac{1}{2x} = 0$$

$$f(x) = \begin{cases} 3x - 5, & x \le 4 \\ x^2 + 1, & x > 4 \end{cases}$$



$$\lim_{x\to -5} f(x) = \lim_{x\to -5} (3x - 5) = 3(-5) - 5 = -20$$

$$\lim_{x\to 4} f(x) = \begin{cases} \lim_{x\to 4^-} f(x) = \lim_{x\to 4^-} (3x-5) = 3\cdot 4 - 5 = 7 \\ \neq \\ \lim_{x\to 4^+} f(x) = \lim_{x\to 4^+} (x^2+1) = 4^2 + 1 = 17 \end{cases} \nexists \lim_{x\to 4} f(x)$$

$$y = \frac{x+3}{x^2+6x+9} \qquad A.V.$$

$$x^2+6x+9=0 \rightarrow x = \frac{-6 \pm \sqrt{6^2-4.1.9}}{2.1} = \frac{-6 \pm 0}{2} = -3$$

Veamos si $x=-3$ es a.v.

$$\lim_{x \to -3} \frac{x+3}{x^2+6x+9} = \frac{-3+3}{(-3)^2+6.(-3)+9} = \left(\frac{0}{0}\right) = \lim_{x \to -3} \frac{(x+3)}{(x+3)^2} = \lim_{x \to -3} \frac{1}{x+3} =$$

$$= \frac{1}{0} = \infty \rightarrow x=-3 \text{ es a.v.}$$

Para situar la curva respecto de la asíntota calculamos

$$\lim_{x \to -3^-} \frac{1}{x+3} \overset{x=-3'1}{=} \frac{+}{-}\infty = -\infty$$

$$\lim_{x \to -3^+} \frac{1}{x+3} \underset{x=-2'9}{=} \frac{+}{+}\infty = +\infty$$

luego

$x=-3$

$$y = \frac{-2x^2+6x}{x^2-3x+1} \qquad A.H.$$

$$\lim_{x \to \infty} \frac{-2x^2+6x}{x^2-3x+1} = \left(\frac{\infty}{\infty}\right) = \lim_{x \to \infty} \frac{-2\cancel{x^2}}{\cancel{x^2}} = -2 \Rightarrow y=-2 \text{ es la a.h.}$$

Posición de la curva respecto de la asíntota:

En $-\infty$, $x=-1000 \rightarrow \dfrac{-2(-1000)^2+6(-1000)}{(-1000)^2-3.(-1000)+1} = \dfrac{-2006000}{1003001} = -2'99\ldots$

En $+\infty$, $x=1000 \rightarrow \dfrac{-2.1000^2+6.1000}{1000^2-3.1000+1} = \dfrac{-1994000}{997001} = -1'99\ldots$

$y=-2$

$$y = \frac{x^3-3x^2-2}{x^2} \qquad A.O.$$

$$\begin{array}{l|l} x^3-3x^2\quad -2 & x^2 \\ \hline -x^3 & x-3 \\ \hline \quad -3x^2 & \\ \quad +3x^2 \; -2 & \\ \hline \qquad\quad -2 & \end{array}$$

$$\begin{array}{rl} & grd(num) = 3 \\ - & grd(den) = 2 \\ \hline & 1 \Rightarrow \text{Hay } A.O. \end{array}$$

La asíntota oblicua es $y = x-3$

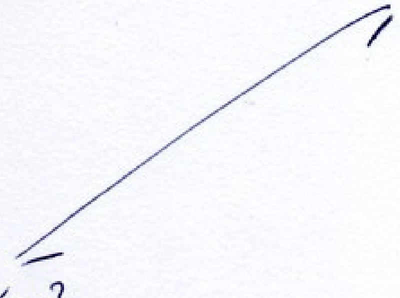
Como $\dfrac{x^3-3x^2-2}{x^2} = x-3 + \dfrac{-2}{x^2}$

Para situar la curva respecto de la asíntota estudiamos el valor de $\dfrac{-2}{x^2}$

En $-\infty$, $x = -1000 \rightarrow \dfrac{-2}{(-1000)^2} = \dfrac{-2}{1000.000} = -0'\ldots$

En $+\infty$, $x = 1000 \rightarrow \dfrac{-2}{1000^2} = \dfrac{-2}{1000000} = -0'0\ldots$

Luego



$y = x-3$

$$f(x) = \begin{cases} x^2 - 3x & x \le 3 \\ 6 - 2x & x > 3 \end{cases}$$

$$\underset{}{x^2-3x} \quad \underset{3}{|} \quad 6-2x$$

¿Es continua en $x = 3$? Sí.

1) $f(3) = 3^2 - 3 \cdot 3 = 0$

2) $\lim\limits_{x \to 3} f(x) = \left\{ \begin{array}{l} \lim\limits_{x \to 3^-} f(x) = \lim\limits_{x \to 3^-} (x^2 - 3x) = 0 \\ \lim\limits_{x \to 3^+} f(x) = \lim\limits_{x \to 3^+} (6 - 2x) = 0 \end{array} \right\} = 0$

3) $f(3) = 0 = \lim\limits_{x \to 3} f(x)$

$f(x)$ es continua en $x = 3$.

¿Es continua en $x = 10$? Sí

1) $f(10) = 6 - 2 \cdot 10 = -14$

2) $\lim\limits_{x \to 10} f(x) = \lim\limits_{x \to 10} (6 - 2x) = -14$

3) $f(10) = -14 = \lim\limits_{x \to 10} f(x)$

$f(x)$ es continua en $x = 10$

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

¿Es continua en $x = -2$?

1) $f(-2) = \dfrac{-2+3}{(-2)^2 + (-2) - 2} = \dfrac{1}{0} \nexists$

$f(x)$ no es continua en $x = -2$

$\lim\limits_{x \to -2} f(x) = \lim\limits_{x \to -2} \dfrac{x+3}{x^2 + x - 2} = \dfrac{1}{0} = \infty$

En $x = -2$ tiene una discontinuidad de salto infinito

¿Es continua en $x = 2$?

1) $f(2) = \dfrac{2+3}{2^2 + 2 - 2} = \dfrac{5}{4}$ ✓

$\parallel \Rightarrow$

2) $\lim\limits_{x \to 2} \dfrac{x+3}{x^2 + x - 2} = \dfrac{5}{4}$

$f(x)$ es continua en $x = 2$