② CALCULAR LÍMITES:

ⓐ $$\lim_{x\to 3} \frac{5-x}{x^2-9} = \frac{5-3}{(3)^2-9} = \frac{2}{0} \text{ (INDETERMINACIÓN)}$$

ANALIZAMOS LÍMITES LATERALES

IZQ.

$$\lim_{x\to 3^-} \frac{5-x}{x^2-9} = \frac{2^+}{0^-} = -\infty$$

2'9999 ; 2'0001 ; -0'00059999

DCHA.

$$\lim_{x\to 3^+} \frac{5-x}{x^2-9} = \frac{2^-}{0^+} = +\infty$$

3'0001 ; 1'9999 ; 0'00060001

> NO EXISTE EL LÍMITE, YA QUE LOS LÍMITES LATERALES NO COINCIDEN.

ⓑ $$\lim_{x\to \infty} \frac{5x+3+2x^2}{5x^2+3x} = \frac{\infty}{\infty} \text{ (INDETERMINACIÓN)}$$

$$\lim_{x\to\infty} \frac{\frac{5x}{x^2}+\frac{3}{x^2}+\frac{2x^2}{x^2}}{\frac{5x^2}{x^2}+\frac{3x}{x^2}} = \lim_{x\to\infty} \frac{\underbrace{\frac{5}{x}}_{\to 0}+\underbrace{\frac{3}{x^2}}_{\to 0}+2}{5+\underbrace{\frac{3}{x}}_{\to 0}} = \frac{2}{5}$$

> EL LÍMITE ES $\frac{2}{5}$

ⓒ $$\lim_{x\to 2} \frac{x^3-3x^2+4}{x^3-x^2-8x+12} = \frac{(2)^3-3\cdot(2)^2+4}{(2)^3-(2)^2-8(2)+12} = \frac{0}{0}$$

(INDETERMINACIÓN)

$x^3-3x^2+4 \longrightarrow$ FACTORIZAR $\longleftarrow x^3-x^2-8x+12$

$$\begin{array}{c|cccc} & 1 & -3 & 0 & 4 \\ 2 & & 2 & -2 & -4 \\ \hline & 1 & -1 & -2 & \boxed{0} \\ 2 & & 2 & 2 & \\ \hline & 1 & 1 & \boxed{0} & \end{array} \qquad \begin{array}{c|cccc} & 1 & -1 & -8 & 12 \\ 2 & & 2 & 2 & -12 \\ \hline & 1 & 1 & -6 & \boxed{0} \\ 2 & & 2 & 6 & \\ \hline & 1 & 3 & \boxed{0} & \end{array}$$

$$\lim_{x\to 2} \frac{\cancel{(x-2)}\cancel{(x-2)}(x+1)}{\cancel{(x-2)}\cancel{(x-2)}(x+3)} = \lim_{x\to 2} \frac{x+1}{x+3} = \frac{3}{5}$$

$$\boxed{\text{EL LÍMITE ES } \frac{3}{5}}$$

ⓓ $$\lim_{x\to\infty} \sqrt{x^3+2x} - \sqrt{3x} = \infty - \infty$$ (INDETERMINADO)

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

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

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

$$\lim_{x\to\infty} \frac{\frac{x^3}{x^3} - \frac{x}{x^3}}{\sqrt{\frac{x^3}{x^6} + \frac{2x}{x^6}} + \sqrt{\frac{3x}{x^6}}} = \lim_{x\to\infty} \frac{1 - \overset{\nearrow 0}{\frac{1}{x^2}}}{\sqrt{\underset{\swarrow 0}{\frac{1}{x^3}} + \underset{\swarrow 0}{\frac{2}{x^5}}} + \sqrt{\underset{\swarrow 0}{\frac{3}{x^5}}}} =$$

$$= \frac{1}{0} = \infty$$

$$\boxed{\text{EL LÍMITE ES } +\infty}$$