

$$1) \lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - x - 2} = \left(\frac{0}{0} \right)$$

$$= \lim_{x \rightarrow 2} \frac{(x^3 - 2^3)}{(x-2)(x+1)}$$

$$= \lim_{x \rightarrow 2} \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+1)}$$

$$= \lim_{x \rightarrow 2} \frac{x^2 + 2x + 4}{x+1}$$

$$= \frac{12}{3}$$

$$= 4$$

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3} = \left(\frac{0}{0} \right)$$

$$= \lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3} \left(\frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2} \right)$$

$$= \lim_{x \rightarrow 3} \frac{x+1 - 4}{(x-3)(\sqrt{x+1} + 2)}$$

$$= \lim_{x \rightarrow 3} \frac{x-3}{(x-3)(\sqrt{x+1} + 2)}$$

$$= \lim_{x \rightarrow 3} \frac{1}{\sqrt{x+1} + 2}$$

$$= \frac{1}{4}$$

$$\lim_{x \rightarrow 25} \frac{\sqrt{x-9} - 4}{\sqrt{x} - 5} = \left(\frac{0}{0}\right)$$

$$= \lim_{x \rightarrow 25} \frac{\sqrt{x-9} - 4}{\sqrt{x} - 5} \left(\frac{\sqrt{x-9} + 4}{\sqrt{x-9} + 4} \right) \left(\frac{\sqrt{x} + 5}{\sqrt{x} + 5} \right)$$

$$= \lim_{x \rightarrow 25} \frac{(x-25)(\sqrt{x} + 5)}{(x-25)(\sqrt{x-9} + 4)}$$

$$= \lim_{x \rightarrow 25} \frac{\sqrt{x} + 5}{\sqrt{x-9} + 4}$$

$$= \frac{10}{8}$$

$$= \frac{5}{4}$$

$$\lim_{x \rightarrow -1} \frac{bx^3 + b}{3bx^2 + 5bx + 2b} = \left(\frac{0}{0}\right)$$

$$= \lim_{x \rightarrow -1} \frac{b(x^3 + 1)}{b(3x^2 + 5x + 2)}$$

$$= \lim_{x \rightarrow -1} \frac{x^3 + 1}{3x^2 + 5x + 2}$$

$$= \lim_{x \rightarrow -1} \frac{(x+1)(x^2 - x + 1)}{(x+1)(3x + 2)}$$

$$= \lim_{x \rightarrow -1} \frac{x^2 - x + 1}{3x + 2}$$

$$= \frac{3}{5}$$

$$\lim_{x \rightarrow \infty} \frac{x^5 + 3x - 1}{x^2 + 5x - 3} = \left(\frac{\infty}{\infty} \right)$$

$$= \lim_{x \rightarrow \infty} \frac{x^3 + \frac{3}{x} - \frac{1}{x}}{1 + \frac{5}{x} - \frac{3}{x^2}}$$

$$= \infty$$

2)

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

$$= \lim_{x \rightarrow 1} \frac{3(x-1)(x+1/3)}{2(x-1)(x+3/2)}$$

$$= \lim_{x \rightarrow 1} \frac{3(x+1/3)}{2(x-3/2)}$$

$$= -4$$

$$\lim_{x \rightarrow 1^+} f(x) = \lim_{x \rightarrow 1} \frac{x-1}{\sqrt{5x-1}-2} = \left(\frac{0}{0} \right)$$

$$= \lim_{x \rightarrow 1} \frac{x-1}{\sqrt{5x-1}-2} \left(\frac{\sqrt{5x-1}+2}{\sqrt{5x-1}+2} \right)$$

$$= \lim_{x \rightarrow 1} \frac{(x-1)(\sqrt{5x-1}+2)}{5x-5}$$

$$= \lim_{x \rightarrow 1} \frac{\sqrt{5x-1}+2}{5}$$

$$= \frac{4}{5}$$

• Los límites laterales son distintos, no es continuo en $x=1$.

3)

$$\underline{x = -1}$$

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

$$\lim_{x \rightarrow -1} \left(\frac{2(x^3 + 1)}{x - 1} + b \right) = \lim_{x \rightarrow -1} (32x - 2) = -32 - 2$$

$$\lim_{x \rightarrow -1} b = -32 - 2$$

$$\boxed{32 + b = -2}$$

$$\underline{x = 3}$$

$$\lim_{x \rightarrow 3^-} f(x) = \lim_{x \rightarrow 3^+} f(x) = f(x = 3)$$

$$\lim_{x \rightarrow 3} (32x - 2) = \lim_{x \rightarrow 3} \frac{b(x^2 + 4x - 21)}{x - 3} = f(x = 3)$$

$$92 - 2 = \lim_{x \rightarrow 3} \frac{b(x+7)(x-3)}{\cancel{x-3}} = 92 - 2$$

$$92 - 2 = 10b = 92 - 2$$

$$\boxed{92 - 10b = 2}$$

$$\begin{array}{l} 32 + b = -2 \\ 92 - 10b = 2 \end{array}$$

$$\begin{array}{l} a = -6/13 \\ b = -8/13 \end{array}$$

4)

$$I(x) = \frac{60x^2}{x^2+4}$$

$$a) \quad I(x=2) = \frac{60(2)^2}{2^2+4} = 30$$

$$b) \quad \lim_{x \rightarrow \infty} \frac{60x^2}{x^2+4} = \left(\frac{\infty}{\infty} \right)$$

$$= \lim_{x \rightarrow \infty} \frac{60}{1 + \frac{4}{x^2}}$$

$$= 60.$$

En el largo plazo tiende a 60 mil dólares.