

Problema 1 Calcular los siguientes límites:

$$1. \lim_{x \rightarrow \infty} \left(\sqrt{2x^2 - x + 1} - \sqrt{2x^2 + 7x - 1} \right)$$

$$2. \lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{2}{x^2 - 1} \right)$$

$$3. \lim_{x \rightarrow \infty} \frac{4^x - 3^x}{5^x - 2^x}$$

$$4. \lim_{x \rightarrow 0} \frac{\tan x - x}{x - \sin x}$$

$$5. \lim_{x \rightarrow 0} (\cos x)^{1/x}$$

$$6. \text{Calcular } n \text{ sabiendo que } \lim_{x \rightarrow \infty} \left(\frac{3x+5}{3x-1} \right)^{nx} = 3$$

Solución:

$$1. \lim_{x \rightarrow \infty} \left(\sqrt{2x^2 - x + 1} - \sqrt{2x^2 + 7x - 1} \right) = -2\sqrt{2}$$

$$2. \lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{2}{x^2 - 1} \right) = 1$$

$$3. \lim_{x \rightarrow \infty} \frac{4^x - 3^x}{5^x - 2^x} = 0$$

$$4. \lim_{x \rightarrow 0} \frac{\tan x - x}{x - \sin x} = 2$$

$$5. \lim_{x \rightarrow 0} (\cos x)^{1/x} = 1$$

$$6. \text{Calcular } n \text{ sabiendo que } \lim_{x \rightarrow \infty} \left(\frac{3x+5}{3x-1} \right)^{nx} = 5 \implies n = \frac{\ln 5}{2}$$

Problema 2 Calcular las siguientes integrales:

$$1. \int (x-1)e^x dx$$

$$2. \int \frac{5e^x}{1+9e^{2x}} dx$$

$$3. \int \frac{5x^2-1}{x+2} dx$$

$$4. \int x \cot x^2 dx$$

$$5. \int x \cos(x) dx$$

Solución:

$$1. \int (x - 1)e^x dx = e^x(x - 2) + C$$

$$2. \int \frac{5e^x}{1 + 9e^{2x}} dx = \frac{5}{3} \arctan(3e^x) + C$$

$$3. \int \frac{5x^2 - 1}{x + 2} dx = \frac{5x^2}{2} - 10x + 19 \ln|x + 2| + C$$

$$4. \int x \cot x^2 dx = \frac{1}{2} \ln|\sin x^2| + C$$

$$5. \int x \cos(x) dx = x \sin x + \cos x + C$$