

Problema 1 Calcular los siguientes límites:

1. $\lim_{x \rightarrow \infty} (\sqrt{2x^2 - x + 1} - \sqrt{2x^2 + 7x - 1})$
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. Calcular n sabiendo que $\lim_{x \rightarrow \infty} \left(\frac{3x + 5}{3x - 1} \right)^{nx} = 3$

Solución:

1. $\lim_{x \rightarrow \infty} (\sqrt{2x^2 - x + 1} - \sqrt{2x^2 + 7x - 1}) = -2\sqrt{2}$
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. Calcular n sabiendo que $\lim_{x \rightarrow \infty} \left(\frac{3x + 5}{3x - 1} \right)^{nx} = 5 \implies n = \frac{\ln 3}{2}$

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:

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

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

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

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

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