

**Problema 1** Calcular los siguientes límites:

$$1. \lim_{x \rightarrow \infty} \left( \sqrt{5x^2 - 3x + 3} - \sqrt{5x^2 + 4x - 2} \right)$$

$$2. \lim_{x \rightarrow 1} \frac{7x^4 - 5x^2 + 3x - 5}{6x^5 - x - 5}$$

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

$$4. \lim_{x \rightarrow \infty} \frac{e^{2x^2+3}}{5x - 1}$$

$$5. \lim_{x \rightarrow 0} \frac{\sin^2 x - 2x}{5x \cos x}$$

**Solución:**

$$1. \lim_{x \rightarrow \infty} \left( \sqrt{5x^2 - 3x + 3} - \sqrt{5x^2 + 4x - 2} \right) = -\frac{7\sqrt{5}}{10}$$

$$2. \lim_{x \rightarrow 1} \frac{7x^4 - 5x^2 + 3x - 5}{6x^5 - x - 5} = \frac{21}{29}$$

$$3. \lim_{x \rightarrow \infty} \left( \frac{2x^2 - 3x + 2}{2x^2 - 1} \right)^{3x} = e^{-9/2}$$

$$4. \lim_{x \rightarrow \infty} \frac{e^{2x^2+3}}{5x - 1} = \infty$$

$$5. \lim_{x \rightarrow 0} \frac{\sin^2 x - 2x}{5x \cos x} = -\frac{2}{5}$$

**Problema 2** Calcular las siguientes integrales:

$$1. \int x e^x dx$$

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

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

$$4. \int 7x e^{5x^2-1} dx$$

$$5. \int \frac{3x}{8x^2 + 2} dx$$

**Solución:**

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

$$2. \int \frac{x^2 - 1}{x^2 + 1} dx = x - 2 \arctan x + C$$

$$3. \int \frac{x^2 + 3}{x - 1} dx = \frac{x^2}{2} + x + 4 \ln |x - 1| + C$$

$$4. \int 7xe^{5x^2-1} dx = \frac{7}{10}e^{5x^2-1} + C$$

$$5. \int \frac{3x}{8x^2 + 2} dx = \frac{3}{16} \ln |8x^2 + 2| + C$$