

Problema 1 Calcular los siguientes límites:

1. $\lim_{x \rightarrow 0} (1 - 3x)^{2/(3x)}$
2. $\lim_{x \rightarrow \infty} \left(\frac{x^2 + 2x - 1}{x^2 + 3} \right)^{5x}$
3. $\lim_{x \rightarrow \infty} (\sqrt{7x^2 - 5x + 2} - \sqrt{7x^2 + 2x - 1})$
4. $\lim_{x \rightarrow 9} \frac{\sqrt{x^2 - 2} - \sqrt{8x + 7}}{x - 9}$
5. $\lim_{x \rightarrow 0} \frac{\cos 3x - e^{5x}}{xe^{3x}}$

Solución:

1. $\lim_{x \rightarrow 0} (1 - 3x)^{2/(3x)} = e^{-2}$
2. $\lim_{x \rightarrow \infty} \left(\frac{x^2 + 2x - 1}{x^2 + 3} \right)^{5x} = e^{10}$
3. $\lim_{x \rightarrow \infty} (\sqrt{7x^2 - 5x + 2} - \sqrt{7x^2 + 2x - 1}) = -\frac{\sqrt{7}}{2}$
4. $\lim_{x \rightarrow 9} \frac{\sqrt{x^2 - 2} - \sqrt{8x + 7}}{x - 9} = \frac{5\sqrt{79}}{79}$
5. $\lim_{x \rightarrow 0} \frac{\cos 3x - e^{5x}}{xe^{3x}} = -5$

Problema 2 Calcular las siguientes integrales:

1. $\int (2x - 3)e^x dx$
2. $\int 9xe^{2x^2+5} dx$
3. $\int e^x \cos(3x) dx$
4. $\int 5x^2(2x^3 - 3)^{12} dx$

5. $\int \frac{6x}{7x^2 - 2} dx$

Solución:

1. $\int (2x - 3)e^x dx = e^x(2x - 5) + C$

2. $\int 9xe^{2x^2+5} dx = \frac{9}{4}e^{2x^2+5} + C$

3. $\int e^x \cos(3x) dx = e^x \left(\frac{\cos(3x) + 3 \sin(3x)}{10} \right) + C$

4. $\int 5x^2(2x^3 - 3)^{12} dx = \frac{5(2x^3 - 3)^{13}}{78} + C$

5. $\int \frac{6x}{7x^2 - 2} dx = \frac{3}{7} \ln |7x^2 - 2| + C$