

**Examen de Matemáticas 1º de Bachillerato CN**  
**Marzo 2014**

---

---

**Problema 1** Calcular los siguientes límites:

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

2.  $\lim_{x \rightarrow 1} \frac{8x^4 - 5x^2 - 4x + 1}{3x^5 + 4x - 7}$

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

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

5.  $\lim_{x \rightarrow \infty} \frac{\sqrt{5x^2 - 9x + 2}}{-x + 8}$

6.  $\lim_{x \rightarrow 0} \frac{x^3 - x}{3x}$

**Solución:**

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

2.  $\lim_{x \rightarrow 1} \frac{8x^4 - 5x^2 - 4x + 1}{3x^5 + 4x - 7} = \frac{18}{19}$

3.  $\lim_{x \rightarrow 5} \frac{\sqrt{4x^2 - 3} - \sqrt{5x + 3}}{x - 2} = \frac{11\sqrt{13}}{26}$

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

5.  $\lim_{x \rightarrow \infty} \frac{\sqrt{5x^2 - 9x + 2}}{-x + 8} = -\sqrt{5}$

6.  $\lim_{x \rightarrow 0} \frac{x^3 - x}{3x} = -\frac{1}{3}$

**Problema 2** Calcular las siguientes derivadas:

1.  $y = (7x^2 - 2)^{12}$

2.  $y = \ln \left( \frac{7x + 2}{5x^2} \right)$

3.  $y = x^3 \sec x$
4.  $y = \frac{\sin x}{x^2 + 5}$
5.  $y = \sec(3x^2 + 2x - 1)^2$
6.  $y = (\cos x)^{5x-2}$

**Solución:**

1.  $y = (7x^2 - 2)^{12} \implies y' = 12(7x^2 - 2)^{11}(14x)$
2.  $y = \ln\left(\frac{7x+2}{5x^2}\right) \implies y' = \frac{7}{7x+2} - \frac{10x}{5x^2}$
3.  $y = x^3 \sec x \implies y' = 3x^2 \sec x + x^3 \sec x \tan x$
4.  $y = \frac{\sin x}{x^2 + 5} \implies y' = \frac{\cos x \cdot (x^2 + 5) - (2x) \sin x}{(x^2 + 5)^2}$
5.  $y = \sec(3x^2 + 2x - 1)^2 \implies y' = 2(6x + 2)(3x^2 + 2x - 1) \tan(3x^2 + 2x - 1)^2 \sec(3x^2 + 2x - 1)^2$
6.  $y = (\cos x)^{5x-2} \implies y' = (\cos x)^{5x-2} \left( 5 \ln(\cos x) - (5x - 2) \frac{\sin x}{\cos x} \right)$

**Problema 3** Calcular las rectas tangente y normal de las siguientes funciones:

1.  $f(x) = \frac{2x - 5}{3x}$  en el punto  $x = 2$ .
2.  $f(x) = (x + 1)e^{x-3}$  en el punto  $x = 3$ .

**Solución:**

1.  $b = f(a) \implies b = f(2) = -1/6$  e  $y - b = m(x - a)$

$$f'(x) = \frac{5}{3x^2} \implies m = f'(2) = \frac{5}{12}$$

$$\text{Recta Tangente: } y + \frac{1}{6} = \frac{5}{12}(x - 2)$$

$$\text{Recta Normal: } y + \frac{1}{6} = -\frac{12}{5}(x - 2)$$

2.  $b = f(a) \implies b = f(3) = 4$  e  $y - b = m(x - a)$

$$f'(x) = (x + 2)e^{x-3} \implies m = f'(3) = 5$$

$$\text{Recta Tangente: } y - 4 = 5(x - 3)$$

$$\text{Recta Normal: } y - 4 = -\frac{1}{5}(x - 3)$$