

**Problema 1** Calcular los siguientes límites:

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

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

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

$$4. \lim_{x \rightarrow \infty} \left( \frac{3x^2 + 8x - 12}{2x^2 + 5x - 1} \right)^{9x+5}$$

$$5. \lim_{x \rightarrow \infty} \left( \frac{7x^2 - 6x - 3}{10x^2 - x + 2} \right)^{\frac{3x+4}{2}}$$

$$6. \lim_{x \rightarrow \infty} \left( \frac{3x - 9}{3x - 1} \right)^{x+2}$$

**Solución:**

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

$$2. \lim_{x \rightarrow \infty} \frac{x^2 + 5x - 7}{7x^3 + x^2 - x + 1} = 0$$

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

$$4. \lim_{x \rightarrow \infty} \left( \frac{3x^2 + 8x - 12}{2x^2 + 5x - 1} \right)^{9x+5} = \infty$$

$$5. \lim_{x \rightarrow \infty} \left( \frac{7x^2 - 6x - 3}{10x^2 - x + 2} \right)^{\frac{3x+4}{2}} = 0$$

$$6. \lim_{x \rightarrow \infty} \left( \frac{3x - 9}{3x - 1} \right)^{x+2} = e^{-8/3}$$

**Problema 2** Calcular los siguientes límites:

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

2.  $\lim_{x \rightarrow \infty} \frac{-2x^5 + 5}{\sqrt{8x + 5}}$
3.  $\lim_{x \rightarrow \infty} \sqrt{\frac{3x^2 - x + 1}{2x^2 - 8x + 3}}$
4.  $\lim_{x \rightarrow \infty} \frac{\sqrt{5x^3 + 2x^2 - 1}}{x^2 - 2}$
5.  $\lim_{x \rightarrow \infty} (\sqrt{2x^2 - x + 2} - \sqrt{2x^2 + 5x - 1})$
6. Sabiendo que  $\lim_{x \rightarrow \infty} \left(\frac{5x + 1}{5x - 1}\right)^{2nx} = 3$ , calcular  $n$ .

**Solución:**

1.  $\lim_{x \rightarrow \infty} \frac{\sqrt{3x^2 - x - 1}}{3x + 2} = \frac{\sqrt{3}}{3}$
2.  $\lim_{x \rightarrow \infty} \frac{-2x^5 + 5}{\sqrt{8x + 5}} = -\infty$
3.  $\lim_{x \rightarrow \infty} \sqrt{\frac{3x^2 - x + 1}{2x^2 - 8x + 3}} = \sqrt{\frac{3}{2}}$
4.  $\lim_{x \rightarrow \infty} \frac{\sqrt{5x^3 + 2x^2 - 1}}{x^2 - 2} = 0$
5.  $\lim_{x \rightarrow \infty} (\sqrt{2x^2 - x + 2} - \sqrt{2x^2 + 5x - 1}) = -\frac{3\sqrt{2}}{2}$
6.  $\lim_{x \rightarrow \infty} \left(\frac{5x + 1}{5x - 1}\right)^{2nx} = 3 \implies n = \frac{5 \ln 3}{4} = 1,373265360.$

**Problema 3** Calcular los siguientes límites:

1.  $\lim_{x \rightarrow 2} \frac{3x^2 - 5x - 2}{x^3 + x^2 - 12}$
2.  $\lim_{x \rightarrow 1} \frac{x^4 + 3x^3 - 3x - 1}{x^4 - 1}$
3.  $\lim_{x \rightarrow 2} \frac{\sqrt{5x^2 - 4} - \sqrt{7x + 2}}{x - 2}$

**Solución:**

$$1. \lim_{x \rightarrow 2} \frac{3x^2 - 5x - 2}{x^3 + x^2 - 12} = \frac{7}{16}$$

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

$$3. \lim_{x \rightarrow 2} \frac{\sqrt{5x^2 - 4} - \sqrt{7x + 2}}{x - 2} = \frac{13}{8}$$