

# Cálculo de límites

## Indeterminación $\infty/\infty$

Calcular los siguientes límites:

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

$$2. \lim_{x \rightarrow \infty} \frac{2x^2 + x + 3}{x^3 + 8x + 5}$$

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

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

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

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

$$7. \lim_{x \rightarrow \infty} \frac{2x + 3}{x + \sqrt[3]{x}}$$

$$8. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 1} - 1}{\sqrt{x^2 + 2} - 4}$$

$$9. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 1}}{x + 1}$$

$$10. \lim_{x \rightarrow \infty} \frac{\sqrt[3]{x^2 + x}}{x + 1}$$

$$11. \lim_{x \rightarrow \infty} \frac{x^2}{10 + x\sqrt{x}}$$

$$12. \lim_{x \rightarrow \infty} \frac{x + 2}{\sqrt{x + 3} - 1}$$

$$13. \lim_{x \rightarrow \infty} \frac{\sqrt[3]{x^2 + 1}}{x + 1}$$

$$14. \lim_{x \rightarrow \infty} \frac{\sqrt{x}}{\sqrt{x + \sqrt{x + \sqrt{x}}}}$$

$$15. \lim_{x \rightarrow \infty} \frac{\sqrt{x+1} + \sqrt{x+4}}{\sqrt{x+2} + \sqrt{x+6}}$$

## Indeterminación 0/0

Calcular los siguientes límites:

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

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

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

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

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

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

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

$$8. \lim_{x \rightarrow 1} \frac{x^{101} - 101x + 100}{x^2 - 2x + 1}$$

$$9. \lim_{x \rightarrow 6} \frac{\sqrt{x-2} - 2}{x - 6}$$

$$10. \lim_{x \rightarrow 2} \frac{(x^2 + 2x)^2 - 14(x^2 + 2x) - 15}{x^4 - 29x^2 + 100}$$

$$11. \lim_{x \rightarrow 1} \frac{x^4 - x^3 + x^2 - 3x + 2}{x^3 - x^2 - x + 1}$$

$$11. \lim_{x \rightarrow 5} \frac{\sqrt{6-x} - 1}{3 - \sqrt{4+x}}$$

$$12. \lim_{x \rightarrow 0} \frac{x}{\sqrt[3]{1+x} - 1}$$

$$13. \lim_{x \rightarrow -2} \frac{x + 2}{\sqrt{x + 3} - 1}$$

$$14. \lim_{x \rightarrow 1} \frac{x - |x|}{2x}$$

$$15. \lim_{x \rightarrow -1} \frac{x - |x|}{2x}$$

$$16. \lim_{x \rightarrow 0} \frac{x - |x|}{2x}$$

## Indeterminación $\infty - \infty$

Calcular los siguientes límites:

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

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

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

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

$$5. \lim_{x \rightarrow 2} \left( \frac{x^2 - 4x + 6}{x^2 - 5x + 4} + \frac{x - 4}{3x^2 - 9x + 2} \right)$$

$$6. \lim_{x \rightarrow \infty} (\sqrt{x^2 - 1} - \sqrt{x^2 + 1})$$

$$7. \lim_{x \rightarrow \infty} \left[ \sqrt{x} (\sqrt{x+1} - \sqrt{x-1}) \right]$$

$$8. \lim_{x \rightarrow \infty} (\sqrt{x - \sqrt{x}} - \sqrt{x + \sqrt{x}})$$

$$9. \lim_{x \rightarrow \infty} (\sqrt{x^4 + 2x^2 - 1} - \sqrt{x^4 - 2x^2 - 1})$$

$$10. \lim_{x \rightarrow \infty} (\sqrt{4x^4 + 13x^2 - 7} - 2x^2)$$

$$11. \lim_{x \rightarrow \infty} (\sqrt{(x+2)(x+1)} - \sqrt{x(x-1)})$$

$$12. \lim_{x \rightarrow \infty} \left( \sqrt{x + \sqrt{x + \sqrt{x}}} - \sqrt{x} \right)$$

$$13. \lim_{x \rightarrow \infty} \left[ \sqrt{x^3 + 1} \left( \sqrt{2x^5 - 2x} - \sqrt{2x^5 + 3x} \right) \right]$$

$$14. \lim_{x \rightarrow \infty} \frac{1}{x(\sqrt{x^2 - 1} - x)}$$

$$15. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 1} - x}{\sqrt{x^2 + 1} - x\sqrt{x}}$$

$$16. \lim_{x \rightarrow \infty} \frac{2x - \sqrt{4x^2 - 1}}{\sqrt{x^2 + 3} - x}$$

$$17. \lim_{x \rightarrow \infty} \frac{\sqrt{2x+1} - \sqrt{2x-1}}{\sqrt{x+1} - \sqrt{x-1}}$$

$$18. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 1} - \sqrt{x^2 - 1}}{\sqrt{x^2 + x} - x - 1}$$

$$19. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 - 6x} - (x - 3)}{x + 3 - \sqrt{x^2 + 6x}}$$

$$20. \lim_{x \rightarrow \infty} \left( \frac{3x^3 + 5}{x + 2} - \frac{4x^3 - x}{x - 2} \right)$$

$$21. \lim_{x \rightarrow \infty} \left( x - \frac{3}{\frac{3}{x} - \frac{3}{x^2} + \frac{1}{x^3}} \right)$$

$$22. \lim_{x \rightarrow \infty} \left[ x \left( \sqrt{\frac{x-1}{x+1}} - 1 \right) \right]$$

$$23. \lim_{x \rightarrow 4} \left( \frac{1}{x} - \frac{1}{4} \right) \frac{1}{x - 4}$$

## Indeterminación $1^\infty$

Calcular los siguientes límites:

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

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

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

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

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

$$6. \lim_{x \rightarrow +\infty} \left( \frac{2x-5}{3x+4} \right)^{5x-1}$$

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

$$8. \lim_{x \rightarrow 0} (1 - 2x^3)^{1/x^3}$$

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

$$10. \lim_{x \rightarrow \infty} \left( \frac{x-1}{x+1} \right)^{x/2}$$

$$11. \lim_{x \rightarrow 0} \left( \frac{2+x}{3-x} \right)^x$$

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

$$13. \lim_{x \rightarrow 1} \left( \frac{x-1}{x^2-1} \right)^{x+1}$$

$$14. \lim_{x \rightarrow \infty} \left( \frac{x-1}{x+2} \right)^{x+3}$$

$$15. \lim_{x \rightarrow +\infty} \left( \frac{7x^2+1}{7x^2-2x} \right)^{2x+1}$$

$$16. \lim_{x \rightarrow +\infty} \left( \frac{2x+3}{x^2+1} \right)^{5x-1}$$

$$17. \lim_{x \rightarrow \infty} \left( 1 + \frac{6}{x} \right)^{2x-1}$$

$$18. \lim_{x \rightarrow 0} (1 + 5x)^{\frac{2}{3x}}$$

$$19. \lim_{x \rightarrow \infty} \left( \frac{x^2+x-1}{x^2+2} \right)^{3x-1}$$

$$20. \lim_{x \rightarrow 6} \left( \frac{x^2-4x-10}{x-4} \right)^{\frac{1}{x-6}}$$

$$21. \lim_{x \rightarrow 3^+} \left( \frac{x-1}{2x-4} \right)^{\frac{1}{x-3}}$$

$$22. \lim_{x \rightarrow +\infty} \left( \frac{4x^3 - 6x^2}{4x^3 - 1} \right)^{\frac{x^2+1}{x}}$$

$$23. \lim_{x \rightarrow 1} \left( \frac{x^2+1}{x+1} \right)^{\frac{1}{\sqrt{x}-1}}$$

$$24. \lim_{x \rightarrow 2} (x^2 - 3)^{\frac{x+1}{x^2-3x+2}}$$