

# Regla de l'Hôpital

Calculeu els següents límits.

$$1 \quad \lim_{x \rightarrow 0} \frac{\ln(1+x) + \ln(1-x)}{x \cdot \sin x}$$

$$2 \quad \lim_{x \rightarrow +\infty} \frac{x \cdot \ln(x+1)}{x^2 + 1}$$

$$3 \quad \lim_{x \rightarrow 1} \left( \frac{1}{x-1} - \frac{1}{\ln x} \right)$$

$$4 \quad \lim_{x \rightarrow 0} \frac{\operatorname{tg}^2 x}{1 - \cos(2x)}$$

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

$$6 \quad \lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{\sin x}$$

$$7 \quad \lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{1}{\sin x} \right)$$

$$8 \quad \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \operatorname{tg} x}{\cos 2x}$$

$$9 \quad \lim_{x \rightarrow 1} \frac{\ln x}{x-1}$$

$$10 \quad \lim_{x \rightarrow 0} \frac{\sin 3x}{x - \frac{3}{2} \sin 2x}$$

$$11 \quad \lim_{x \rightarrow 0} \frac{e^x - 1}{x}$$

$$12 \quad \lim_{x \rightarrow 0} \frac{\ln(\cos(3x))}{\ln(\cos(2x))}$$

$$13 \quad \lim_{x \rightarrow +\infty} (x^2 \cdot e^{-x}).$$

$$14 \quad \lim_{x \rightarrow 0} (\cos x)^{1/x^2}$$

$$15 \quad \lim_{x \rightarrow +\infty} (e^{3x} - 5x)^{1/x}$$

$$16 \quad \lim_{x \rightarrow 0} \frac{x - \sin x}{x^3}$$

## Soluciones:

$$1 \quad \lim_{x \rightarrow 0} \frac{\ln(1+x) + \ln(1-x)}{x \cdot \sin x} = -1$$

$$2 \quad \lim_{x \rightarrow +\infty} \frac{x \cdot \ln(x+1)}{x^2 + 1} = 0$$

$$3 \quad \lim_{x \rightarrow 1} \left( \frac{1}{x-1} - \frac{1}{\ln x} \right) = \frac{-1}{2}$$

$$4 \quad \lim_{x \rightarrow 0} \frac{\operatorname{tg}^2 x}{1 - \cos(2x)} = \frac{1}{2}$$

$$5 \quad \lim_{x \rightarrow +\infty} \left( \frac{x+2}{x} \right)^{2x+1} = e^4$$

$$6 \quad \lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{\sin x} = 2$$

$$7 \quad \lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{1}{\sin x} \right) = 0$$

$$8 \quad \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \operatorname{tg} x}{\cos(2x)} = 1$$

$$9 \quad \lim_{x \rightarrow 1} \frac{\ln x}{x-1} = 1$$

$$10 \quad \lim_{x \rightarrow 0} \frac{\sin(3x)}{x - \frac{3}{2} \sin(2x)} = \frac{-3}{2}$$

$$11 \quad \lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$$

$$12 \quad \lim_{x \rightarrow 0} \frac{\ln(\cos(3x))}{\ln(\cos(2x))} = \frac{9}{4}$$

$$13 \quad \lim_{x \rightarrow +\infty} (x^2 \cdot e^{-x}) = 0$$

$$14 \quad \lim_{x \rightarrow 0} (\cos x)^{1/x^2} = e^{-1/2}$$

$$15 \quad \lim_{x \rightarrow +\infty} (e^{3x} - 5x)^{1/x} = e^3$$

$$16 \quad \lim_{x \rightarrow 0} \frac{x - \sin x}{x^3} = \frac{1}{6}$$