

Example 1

Calculate with and without using l'Hopital's rule.

$$\lim_{y \rightarrow 0} \frac{\sin(y)\cos(y)}{\sin(2y)}$$

Example 2

Calculate the limit. Note that $\ln(8x^2)$ and $\ln(1 - \cos x)$ are undefined at $x = 0$ but that this limit may exist nevertheless.

$$\lim_{x \rightarrow 0} \ln(8x^2) - \ln(1 - \cos x)$$

Example 3

Calculate the limit.

$$\lim_{y \rightarrow 1+} y^{\frac{1}{1-y}}$$

Example 4

Calculate the limit or explain why the limit does not exist

$$\lim_{x \rightarrow 0} \frac{\tan(x)}{1 - \cos(x)}$$

Example 5

Calculate the limit or explain why the limit does not exist

$$\lim_{x \rightarrow 0+} \frac{x - 1}{x^3}$$

Problem 1

Calculate with and without using l'Hopital's rule.

$$\lim_{y \rightarrow 2\pi} \frac{\sin(6y)}{\sin(3y)}$$

Hint: $\sin(6y) = \sin(2(3y))$ and follow example 1.

Problem 2

Calculate the limit.

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

Problem 3

Calculate the limit.

$$\lim_{x \rightarrow 0^+} \frac{1}{x^4} - \frac{1}{x^5}$$