

Ex. 1 Find the domain of $f(x) = \sqrt{\ln \cos x}$.

Ex. 2 Calculate the limit $\lim_{n \rightarrow \infty} \sqrt[n]{7 \cdot 6^n + 5 \cdot 4^n + 3 \cdot 2^n}$.

Ex. 3 Calculate the limit $\lim_{n \rightarrow \infty} \left(\frac{n^2 - 9}{n^2} \right)^{\frac{n}{3}}$.

Ex. 4 Calculate the limit (do not use de l'Hôpital's rule): $\lim_{x \rightarrow 0} \frac{\sin 2x}{\tan x}$.

Ex. 5 Show that the limit $\lim_{x \rightarrow 0} \frac{|x|}{x}$ does not exist.

Ex. 6 Calculate the first derivative and determine its domain $D_{f'}$, when $f(x) = \left(x^2 + \frac{1}{x^3}\right) e^{-x}$.

Ex. 7 Calculate the limit, using de l'Hôpital's rule: $\lim_{x \rightarrow 0} \frac{\ln(2x + 1)}{x}$.

Ex. 8 Let $f(x) = x \ln x$.

Determine the properties of function f :

domain, asymptotes, parity, periodicity,

monotonicity, extrema, concavity.

Calculate f' , f'' and determine their domains.

Sketch the graph of f , consistent with its properties.

Ex. 9 Check the continuity of f , when $f(x) = \begin{cases} e^{-\frac{1}{x^2}} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$.