

Ex. 1 Solve inequality $\sin^2 x - \sin x \leq \cos^2 x$.

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

Ex. 3 Calculate the limit $\lim_{n \rightarrow \infty} \left(\frac{n+4}{n+3}\right)^{2n+1}$.

Ex. 4 Calculate the limit (do not use de l'Hospital's rule): $\lim_{x \rightarrow 1} \frac{1-x^4}{1-x^6}$.

Ex. 5 Show that the derivative $f'(0)$ does not exist, when $f(x) = |x|$.

Ex. 6 Calculate the first derivative and determine its domain when $f(x) = x^x$.

Ex. 7 Calculate the limit using de l'Hopital's rule: $\lim_{x \rightarrow 0^+} x^{\tan x}$.

Ex. 8 Let $f(x) = \frac{x^2}{x+1}$.

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 $f(x) = \begin{cases} \frac{\sin x}{x} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$.