Attention! Please, note that this is the closed book test. You are not allowed to use graphing calculator. Simple calculators are allowed. Please, show all important steps in your solution but do not make your solution excessively long.

1. Consider one-sided limits at $x = 1$ to show that

$$\lim_{x\to1} \frac{|x - 1|}{x^2 - 1}$$

does not exist.
2. Prove using $\varepsilon$–$\delta$ definition of the limit that

$$\lim_{x \to 3}(x^2 - 4) = 5.$$
3. Evaluate limit

\[
\lim_{x \to 0} \frac{x}{\sqrt{1 - x} - \sqrt{1 + x}}.
\]
4. Evaluate limit at infinity

$$\lim_{x \to \infty} \frac{x^3 - (x + \frac{1}{x})^3}{x}$$
5. It is known that the function $f(x)$ satisfies the following inequality

$$|f(x)| < x^2.$$ 

Use the Squeeze Theorem to prove that

$$\lim_{x \to 0} f(x) = 0.$$
6. Use definition of the derivative to find the derivative at \( x = 2 \) of the function

\[
f(x) = \frac{1}{x^2}.
\]

(Comment: you are NOT allowed to use the Power Rule in this problem. Use one of the definitions for the derivative of a function at a point.)