The purpose of these exercises is to extend some techniques of calculating limits. It is important to practice the tools we learn and develop a logical and methodical way of thinking.

Solve the following limits (it might not exist). Justify all answers.

(1) \( \lim_{{x \to \infty}} \frac{\sqrt{x^2 + 1}}{3 - 5x} \)

(2) \( \lim_{{x \to 1}} \frac{x^3 - 1}{x - 1} \)

(hint: \(a^3 - b^3 = (a - b)(a^2 + ab + b^2)\))
(3) \[ \lim_{x \to 0} \frac{\sqrt{1 - x}}{x} \]

(4) \[ \lim_{x \to 0} \frac{\sqrt{1 + x}}{x} \]

(5) \[ \lim_{x \to 0} \frac{\sqrt{1 - x} - \sqrt{1 + x}}{x} \]

(hint 1: \((a - b)(a + b) = (a^2 - b^2)\))
(hint 2: \(X = X \cdot \frac{A}{A}\))