Exercise 1. Evaluate the limit
\[ \lim_{n \to \infty} \frac{5n^2 + 2n + 1}{3n^2 + n + 2} \]

Exercise 2. Let \( A \subset \mathbb{R} \), \( \sup(A) = \alpha \in \mathbb{R} \). Construct a monotone increasing sequence \((b_n)\) in \( A \) converging to \( \alpha \).

Exercise 3. Let \( a > 0 \), show that \( \lim_{n \to \infty} \frac{a^n}{n!} = 0 \).

Exercise 4. Let \( p \in \mathbb{N} \), and \( b \in \mathbb{R} \) satisfying \( 0 < b < 1 \). Show that \( \lim_{n \to \infty} nb^n = 0 \).

Exercise 5. Let \((x_n)\) be a sequence of positive real numbers. Suppose \( \lim_{n \to \infty} \sqrt[n]{x_n} = L \), where \( L \) is a non-negative real number.

(a) If \( 0 \leq L < 1 \), show that \( \lim_{n \to \infty} x_n = 0 \).

(b) If \( L > 1 \), show that \((x_n)\) is divergent.

(c) What happens if \( L = 1 \)?