SUMMER WORKSHOP IN MATHEMATICS

(SWIM@KSOM - 2025)

Analysis

(Problem Sheet 3)

1. Prove the Bernoulli's Inequality:

$$(1+x)^n \geq 1 + nx \quad \forall x > 0$$

2. Let $0 < b < 1$, evaluate $\lim_{n\to\infty} b^n$.

3. Let $c > 0$, evaluate $\lim_{n\to\infty} c^{\frac{1}{n}}$.

4. Evaluate $\lim_{n\to\infty} n^{\frac{1}{n}}$.

5. Let $\{x_n\}$ be a sequence such that $x_1 = 0, x_{n+1} = \frac{x_n+1}{2}$ Discuss the convergence of the sequence $\{x_n\}$.

6. Let $\{x_n\}$ be a sequence such that $x_1 = 1, x_{n+1} = \sqrt{2x_n}$ Discuss the convergence of the sequence $\{x_n\}$.