1. Suppose \( a_n > 0 \) and \( a_{n+1}/a_n \geq n/(n+1) \) for all \( n \). Determine whether \( \sum_n a_n \) converges or diverges.

2. If \( S(x) = \int_0^x \sin(t^2) \, dt \), find \( \lim_{x \to 0} \frac{x^3 - 3S(x)}{x^7} \).

3. Find the Maclaurin polynomial of degree 4 of the function \( F(x) = \sqrt{1 + \sin x} \).

4. Which function has Maclaurin series
   \[ 1 - \frac{x}{2!} + \frac{x^2}{4!} - \cdots \]?

5. What is the Fourier series of the 2\( \pi \) periodic function \( h(t) = \cos^2 t \)?

6. Write down the Fourier series of the 2\( \pi \)-periodic function \( f(t) = \pi - |t|, \quad -\pi \leq t < \pi \),
   and use it to evaluate the series
   \[ \sum_{n=0}^{\infty} \frac{1}{(2n+1)^2}. \]