1. Find the Taylor polynomial with remainder by using the given values of $a$ and $n.$

$f(x) = \sqrt{x}, \ n = 4, \ a = 4$

2. Find the Maclaurin series of the given function $f$ by substitution in one of the known series.

$f(x) = \sin^2(x) = \frac{1}{2}(1 - \cos(2x))$
3. Find the Taylor series of the given function at the indicated point \( a \).
\[ f(x) = e^{2x}, \ a = 0 \]

4. Use the integral test to test the given series for convergence.
\[ \sum_{n=2}^{\infty} \frac{1}{n \ln n} \]

5. Determine the convergence or divergence of the given series. Explain BRIEFLY.
   (a) \[ \sum_{n=1}^{\infty} \frac{1}{n^{4/3}} \]
   (b) \[ 1 + \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \cdots \]

6. Use the direct comparison test to determine the convergence or divergence of the series
\[ \sum_{n=2}^{\infty} \frac{\ln n}{n + 1}. \]

7. Use the ratio test to determine the convergence or divergence of the series
\[ \sum_{n=0}^{\infty} \frac{n!}{n3^n}. \]