1. Determine the interval of convergence and the radius of convergence for the power series 
\[ \sum_{n=1}^{\infty} (-1)^n \frac{(2x+3)^n}{n \ln(n)} \].

2. (a) Find the Taylor series for \( f(x) = \ln(x) \) around \( x = 2 \).
(b) Find the Taylor series for \( g(x) = (x - 2)^2 \ln(x) \) around \( x = 2 \).

3. Recall that \( \frac{1}{1-x} = \sum_{n=0}^{\infty} x^n \) for \( |x| < 1 \).
(a) Use this MacLauren series to find a Taylor series for \( -\ln(1-x) \).
(b) Find the first five terms in the MacLauren series for \( -\ln(1-x) \).

4. Recall that 
\[ e^x = \sum_{n=1}^{\infty} \frac{x^n}{n!} \quad \frac{1}{1-x} = \sum_{n=1}^{\infty} x^n \quad \cos(x) = \sum_{n=1}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} \]
(a) Express \( \int \cos(x^2)dx \) as a power series.
(b) What is the radius of convergence for this power series?
(c) Find the fourth degree Taylor polynomial for \( \frac{e^x}{1-x} \).

5. (a) Find the Taylor series of \( (2-x)^{-3} \) centered at 1.
(b) Use Taylor’s Inequality to find an upper bound for \( R_3(x) \), when \( \frac{1}{2} \leq x \leq \frac{3}{2} \).

6. Determine whether the series 
\[ \sum_{n=0}^{\infty} \left( \frac{n}{n^2 + 1} \right)^n \]
converges absolutely, converges conditionally, or diverges.

7. Find the radius of convergence and interval of convergence of the power series 
\[ \sum_{n=2}^{\infty} \frac{(x-2)^n}{n(n \ln(n))^2} \].

8. (a) Determine the power series centered at 0 which represents the function \( \sinh(x) = \frac{e^x - e^{-x}}{2} \).
(b) Determine the power series centered at 0 which represents the function \( \cosh(x) = \frac{d}{dx} \sinh(x) \).