1. Find a power series representation of the function and determine the radius of convergence.

   a) \( f(x) = \frac{1}{1+x} \).

   b) \( f(x) = \frac{x}{1-4x^2} \).

   c) \( f(x) = \frac{1}{3+2x} \).

   d) \( f(x) = \frac{1}{(1+x)^2} \) (Hint: differentiate the function in (a))

   e) \( f(x) = \frac{x}{(1+x)^3} \).

   f) \( f(x) = x \ln(1 + x) \).

2. Approximate \( \int_0^{25} x \tan^{-1} x \, dx \) to 6 decimal places.

3. Find the Maclaurin series for \( f(x) = \cos 2x \) using the definition of a Maclaurin series, and show that the radius of convergence is \( \infty \).

4. Find the Taylor series for \( f(x) = \ln x \) centered at \( a = 2 \).

5. Use known Maclaurin series to obtain a Maclaurin series for the given function.

   a) \( f(x) = \sin x^2 \).

   b) \( f(x) = x e^{-x} \).

6. Evaluate the indefinite integral \( \int_0^\cos x \frac{\cos x}{x} \, dx \) as an infinite series.

7. Use the binomial series to find the first four terms of the Maclaurin series of \( f(x) = \sqrt{4 + x^2} \).