

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

a.  $f(x) = \ln(1 - x)$

b.  $f(x) = \frac{3}{1 - x^4}$

c.  $f(x) = x^3 \tan^{-1}(2x^2)$

2. Use a power series to approximate the definite integral to three decimal places.

$$\int_0^{0.4} \ln(1 + x^4) dx$$

3. Starting with the series  $\sum_{n=0}^{\infty} x^n$ , find the sum of the series  $\sum_{n=1}^{\infty} \frac{x^n}{n}$  and then use it to find the sum of the series  $\sum_{n=1}^{\infty} \frac{1}{3^n \cdot n}$