1. Given the function and its power series below, use several power series operations in a row to find the series for the desired function below it. Tell which operations are used.

\[
\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n
\]

\[
\frac{d}{dx} \frac{x^5}{1+x^3} = ?
\]

2. Given the function and its power series below, use several power series operations in a row to find the series for the desired function below it. Tell which operations are used.

\[
\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n
\]

\[
\ln(x+1) = ?
\]

3. Find the radius of convergence and the interval of convergence for the power series below.

\[
\sum_{n=0}^{\infty} \frac{5^n}{2^n (n+1)} (x-4)^n
\]

4. Consider the function \( f(x) = \frac{1}{x^2} \) and the value \( a = 1 \).
   a) Give the Taylor polynomial \( P_4(x) \) expanded about \( a = 1 \).
   b) Give the remainder \( R_4(x) \).
   c) Approximate \( \frac{1}{(1.6)^2} \) using \( P_4(x) \) above.
   d) Bound \( R_4(1.6) \) above and below.
   e) Give the infinite Taylor series for \( f(x) = \frac{1}{x^2} \) in sigma notation.

5. Use the binomial series to expand the function \( f(x) = \frac{1}{\sqrt{1-x^2}} \) as a power series. State the radius of convergence. Then integrate the function and its power series to find a power series for the inverse sine function.