1. Find the radius of convergence of:

\[ \sum_{n=1}^{\infty} \frac{z^{3n}}{2^n}. \]

Find the analytic function represented by this power series.

2. Arfken, section 11.5, page 496, problem 11.1.5. Assume the log is taken with the principle branch and explain where \( \log_{PB}(1 + z) \) is analytic. Establish the Taylor expansion of \( \log(1 + z) \) about the origin.

3. Arfken, section 11.5, pages 496–497, problems 11.5.7 and 11.5.8.

4. Find the Laurent expansion of \( f(z) = \frac{z(z^2 + 1)^{-1}}{z_0 = i} \) and state the maximal annular region on which the expansion is valid.