1. Evaluate the following integral:

\[ \int_{\Gamma} \frac{z^3 + 4}{z(z-5)^3} \, dz \]

where \( \Gamma \) is the curve defined by \( |z| = 7 \).

2. Use Cauchy’s integral formula to derive the Cauchy estimates:

\[ \left| \frac{d^n f}{dz^n} \right| \leq M \frac{n!}{R^n} \]

where \( |f(z)| \leq M \) in the open disk of radius \( R \).

3. Given the power series for \( f(z) = \sum_{n=0}^{\infty} a_n z^n \), use Cauchy’s general integral formula to show that the coefficients are related to the nth derivative by

\[ a_n = \frac{1}{n!} \frac{d^n f}{dz^n} \]

4. Without computing the Taylor series for the following functions around \( z_0 = 0 \), find the radius of convergence:

a) \( \frac{z^3}{z-3i} \)

b) \( \tan z \)

5. Find the Laurent series expansion for

\[ e^{1/z} \]

for \( |z| > 0 \).