

MATH316 Midterm Test 2 – (November 21, 2007)

Problem 1. [12], Find power series expansion of function $f(z) = \frac{z^4}{(4-z)^2}$ around the points $z_0 = 0$, determine the corresponding radius of convergence.

Problem 2. [12], Use Residue Theorem to evaluate the integral $\int_{\gamma} \frac{z^2 \tan(z)}{d} z$, where γ is the positively oriented circle $|z - 1| = 2$.

Problem 3. [14], Find the value of improper integral $\int_{-\infty}^{\infty} \frac{x^3 \sin x}{1+x^4} dx$.

Problem 4. [12], Determine the number of zeros (counting multiplicities) of the polynomial $p(z) = z^4 + 2z^3 + 3z^2 - 9z + 2$ in the domain $\Omega = \{1 < |z| < 4\}$.