

29:171 - Homework Assignment #5

1. Find the Laurent series for $e^{1/z}$ about the origin. What kind of isolated singularity does this function have at $z = 0$?
2. Find the Laurent series for $\cosh(z + 1/z)$ about the origin. What kind of isolated singularity does this function have at $z = 0$?
3. Let $f_1(z)$ be analytic in a region R_1 . Assume that $f_2(z)$ is analytic in a region R_2 . Assume that R_1 and R_2 have a not empty, simply connected intersection that contains an open set, and that f_1 and f_2 agree on the intersection. Use Morerra's theorem to show that the function $g(z) = f_1(z)$ on R_1 and $f_2(z)$ on R_2 is analytic.

4. What is the radius of convergence of the Taylor series of the analytic function

$$f(z) = \frac{1}{(z-4)(z^2+5)}$$

about the point $z_0 = 10i$?

5. Use Cauchy's theorem to evaluate the integral

$$\int_0^\infty e^{iby^2}$$

where b is real.

6. What can you say about an entire function that is bounded by $|z^{3/2}|$ for large z ?