

Ma 416: Complex Variables

Homework Assignment 8

Prof. Wickerhauser

Due Thursday, November 3, 2005

Read R. P. Boas, *Invitation to Complex Analysis*, Chapter 2, sections 14A–15F.

1. Find the Laurent series (in powers of $(z - 0)$) in the punctured disk $0 < |z| < 1/4$ and in the annulus $1/4 < |z|$ for the function $f(z) = z^{-2}(4z - 1)^{-1}$.
2. Find three terms of the Maclaurin series for $f(z) = e^{-z} \sin z$, valid in some disk centered at zero.
3. Find the Laurent series for $f(z) = e^z/(1 - z)$ valid in a punctured neighborhood of ∞ .
4. Find three terms of the Laurent series for $f(z) = e^z/\sin z$ valid in some punctured disk centered at zero.
5. Use Laurent series to find the residue of $f(z) = z^{-6}e^{z^2} \tan z$ at $z = 0$.
6. Find four terms in the Maclaurin series of $\sin(\sin z)$.