

Ma 416: Complex Variables

Homework Assignment 5

Prof. Wickerhauser

Due Thursday, October 6th, 2005

Read R. P. Boas, *Invitation to Complex Analysis*, Chapter 2, sections 8A–8H.

1. Classify the following singularities as removable, poles, or essential. If the singularity is a pole, state its order.
(a) $1/(e^{z^2} - 1)$ at $z = 0$ (b) $e^{1/z}$ at $z = 0$ (c) $z/\sin z$ at $z = 0$
2. Find the residues of the following functions at the indicated points.
(a) $1/(e^z - 1)$ at $z = 0$ (b) $z^4/(z - \frac{1}{6}z^3 - \sin z)$ at $z = 0$
(c) $(z^2 + 1)/z^4 - 1$ at $z = 1$ and $z = i$.
3. Find the residue of the function $f(z) = 1/\sinh^2 z$ at $z = 0$.