

The University of Waikato
Department of Mathematics

Advanced Calculus math311-07A 2007 Complex Assignment 3

Due Friday 18'th May: Please hand back your completed assignment through the slot outside the Mathematics Office G3.19. It should be written up neatly and on no more than four sides of an A4 page or the equivalent.

1. Evaluate the integral

$$\int_{\Gamma} \frac{z+4}{(z-i)(z+2)} dz,$$

where Γ is the circle centre i radius 1, using partial fractions, Cauchy's theorem and parametric evaluation

2. Find the center, radius of convergence and circle of convergence of the power series

$$f(z) = \sum_{n=1}^{\infty} \frac{(-1)^n (z+i)^n}{n2^n}.$$

Examine the convergence, or otherwise, of the series on the circle of convergence.

3. If the following function $f(z)$ was expanded in a power series about the point $z = 1 + i$ what would be the radius of convergence? Do not perform the expansion.

$$f(z) = \frac{z}{(z-3i)(z+2)}.$$

4. Find and classify the zeros and singularities in the finite complex plane for the function and sketch a domain on which it is single valued.

$$f(z) = \frac{z^2 \sqrt{z-i}}{(z+i)(z-2)^3}.$$

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11th May 2007