

Homework 5

Complex Analysis, MTH 431, Spring 2014

Hand-in Problems Due: Monday April 9th 2014

Topics: Chapters 6 & Section 7.1

1. Let γ be a contour such that $a \in I(\gamma)$. Use deformation Theorem to show that

$$\int_{\gamma} (z - a)^n dz = \begin{cases} 0, & \text{if } n \neq -1 \\ 2\pi i, & \text{if } n = -1 \end{cases}$$

Carefully justify your steps.

2. Evaluate $\int_{\gamma} \frac{e^{2z}}{z+3} dz$, where γ is: (a) the circle $|z| = 4$, (b) the circle $|z| = 1$
3. Evaluate $\int_{\gamma} \frac{e^{5z}}{z^3} dz$, where γ is the circle $|z| = 1$.
4. Evaluate $\int_{\gamma} \left(\frac{\cos z}{z}\right)^2 dz$, where γ is the circle $|z| = 3$.
5. Evaluate $\int_{\gamma} \frac{3}{z^2 - 4} dz$, where γ is the circle $|z| = 4$.