

Course 2325 2010 Complex Analysis I

Sheet 4

Due: at the end of the lecture

Exercise 1

Calculate the residues:

(i) $\text{Res}_0 \frac{z^2 - e^z}{z^5 - z}$

Solution

$$\text{Res}_0 \frac{z^2 - e^z}{z^5 - z} = \frac{(z^2 - e^z)|_{z=0}}{(z^5 - z)'_{z=0}} = \frac{-1}{-1} = 1$$

(ii) $\text{Res}_1 \frac{\cos(2\pi z) - z}{e^{z-1} - 1}$

Solution

$$\text{Res}_1 \frac{\cos(2\pi z) - z}{e^{z-1} - 1} = \frac{(\cos(2\pi z) - z)|_{z=1}}{(e^{z-1} - 1)'_{z=1}} = \frac{1 - 1}{1} = 0.$$