

Complex Analysis – Homework 2

1. Compute the integrals

$$\int_{\gamma} \frac{\sin z}{z} dz \text{ where } \gamma(t) = e^{it}, \quad 0 \leq t \leq 2\pi,$$
$$\int_{\gamma} \frac{\log z}{z-3} dz, \text{ where } \gamma(t) = 2 + \frac{3}{2}e^{it}, \quad 0 \leq t \leq 2\pi.$$

2. Compute the integrals

$$\int_{\gamma} \frac{e^{iz}}{z^2} dz, \quad \text{where } \gamma(t) = e^{it}, \quad 0 \leq t \leq 2\pi,$$
$$\int_{\gamma} \frac{1}{(z-5)^3} dz, \quad \text{where } \gamma(t) = 4 + 2e^{it} \quad 0 \leq t \leq 2\pi.$$

3. Find the power series expansion of \sqrt{z} about $z = 1$ and find its radius of convergence.
4. Find the radius of convergence about $z = 0$ of

$$\frac{1}{\cos z}$$

and the radius of convergence about 2 of

$$\frac{1}{e^z - 1}.$$