Real Analysis(H2) (MA4.101a)

IIIT-H, Semester Monsoon 22, Assignment 2

Submission deadline: 31st January 2023

---

1. Given a function $f(z) = \sqrt[3]{r}e^{i\theta/3}$, where $r > 0$ and $0 < \theta < 2\pi$ show that $f'(z)$ exist and that

$$f'(z) = \frac{1}{3(f(z))^2}\,.$$

2. Calculate

$$\oint_C \frac{z^2}{z-4}dz$$

where C is circle $|z| = 1$ in anticlockwise direction.

3. Let C denote a square that is a positively oriented boundary of square whose sides lie along the lines $x = \pm 5$ and $y = \pm 6$. Then evaluate the following

$$\oint_C \frac{z}{2z+1}$$

4. Show that for $|z| < \infty$

$$z^2 e^{3z} = \sum_{n=2}^{\infty} \frac{3^{n-2}}{(n-2)!} z^n$$