MA 201 Complex Analysis
Quiz 2
IIT Dharwad (Autumn 2021)

Total Marks: 15 **Date & Time:** 15 September 2021, 4:00 pm to 4:30 p.m.

(1) **[3M]** Find the Taylor's series representation of the function $f(z) = \frac{1}{z^2}$ around the point c where c is the last two digits of your roll number (for example, if your roll number is 190010023, then c=23). Justify your answer.

(2) **[2M]** Determine whether the function $f(z) = |z|$ has an antiderivative in the complex plane. Justify your answer.

(3) **[3M]** Let c be the last two digits of your roll number (for example, if your roll number is 190010023, then c=23) and $g(w) = \int_{|z|=c} \frac{z^3+2z^2-z}{(z-w)^3} dw$. Find $g(c-1)$ and $g(c+1)$. Justify your answer.

(4) **[3M]** Let f be an entire function such that $|f'(z)| > M$ for all $z \in \mathbb{C}$ where M is some positive real number. Show that $f(z)$ is a linear function in z.

(5) **[2M]** Find the radius of convergence of the power series $\sum_{n=0}^{\infty} n(z+ic)^n$ where c is the last two digits of your roll number (for example, if your roll number is 190010023, then c=23). Justify your answer.

(6) **[2M]** Find all the entire functions f such that $f(1/n) = c$ for all $n \in \mathbb{N}$. Here c is the last two digits of your roll number (for example, if your roll number is 190010023, then c=23). Justify your answer.