Department of Mathematics,
Indian Institute of Technology Patna

MA 218, Complex Analysis

Quiz-1. February 16, 2023 Maximum Marks: 10

Instruction: Please do not forget to write your **name and roll number** in the answer sheet.

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(1) Prove or disprove, the function

$$f(z) = \frac{z^2 + (2-i)z - 2i}{z - i}$$

is continuous at $z = i$. 1.5 marks.

(2) Let

$$f(z) = \begin{cases} 0 & ; \quad \text{if } z = 0 \\ e^{-z^{-4}} & ; \quad \text{if } z \neq 0. \end{cases}$$

Prove or disprove f is an analytic at $z = 0$. 1.5 marks.

(3) Let f be an analytic function in a domain D. If $arg f$ is constant then prove that f is constant in D. 3 marks.

(4) The function $f(z)$ is an analytic in a domain D if and only if both real and imaginary parts of $f(z)$ and $zf(z)$ are harmonic in D. 4 marks.