

Roll# Student 1:

Roll# Evaluator 1:

Roll# Student 2:

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Problem 1

Find poles and zeros of the rational function $R(z) = \frac{4z + 4 - 8i}{z^2 + 2iz + 3}$ and express it in the factorized form.

Problem 2

Write each of the following in the form $x + iy$, when log is complex logarithmic with base e

(a) e^{3+4i}

(b) $\cos(1 - i)$

Problem 3

Find the principal values of the following.

(a) $\text{Log}(-ei)$

(b) $\text{Log}(1 - i\sqrt{3})$

Problem 4

For the given functions

(a) $f(z) = \frac{1}{z}$

(b) $f(z) = z^3$

- (i) Find all the points where $f'(z) = 0$.
- (ii) Show that there is a domain on which the function is one-to-one. Find all the points in this domain.
- (iii) If possible, define the corresponding range of $f(z)$ in the set notation.
- (iv) If possible, find its inverse function $f^{-1}(z)$.

Problem 5

Under the following transformations,

(a) $f(z) = (1 + i)z - 2$

(b) $f(z) = \frac{1}{z}$

draw the image of each of the following objects in the complex plane.

(i) $\{z : \text{Re } z = -\text{Im } z\}$

(ii) $\left\{z : \left|z - \frac{1}{2}\right| = \frac{1}{2}\right\}$