BRAC University

Department of Mathematics and Natural Sciences

Total Points: 15

Assignment-01

Course Code: MAT215

Complex

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Section: 12

Semester: FALL 2025

Submission Date: _____

Assigned by

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Question 1

Find all possible values of z such that

$$z^7 = -64\sqrt{3} - 64i$$

Locate them in the complex plane. Show that they are contained in a circle and find the radius of that circle. Also find the angular distance between two adjacent roots.

Solution:

Question 2

Consider the equation

$$|z - 7i| - |z + 7i| = 8$$

Describe the above locus in the complex plane.

Solution:

Question 3

Consider the inequality

$$\left|\frac{z+8i}{z-8i}\right| \leq 6$$

Describe the above locus in the complex plane.

Solution:

Question 4

Solve the following equation for z:

$$e^{3z} = -\frac{7}{2} + \frac{7\sqrt{3}i}{2}$$

Express z as $x + iy$ where $x, y, \in \mathbb{R}$.

Solution:

Question 5

Prove that

$$\coth^{-1} z = \frac{1}{2} \ln \left(\frac{z+1}{z-1} \right).$$

Solution:

Question 6

Solve for z:

$$\tanh^{-1} z = 6 + 2i$$

Solution:

Question 7

Solve

Solution:

Question 8

Solve

Solution:

Question 9

Solve

Solution:

Question 10

Using the definition show that

$$f(z) = 6z^2 + 8z - 2$$

is differentiable at all points. Also find the derivative.

Solution:

Question 11

Using the definition, find the derivative of

$$f(z) = \frac{9}{7z+5} \quad \text{at} \quad z = z_0$$

.

Solution: