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🏛 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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❷ Question 1

Find all possible values of z such that

$$z^7 = 64\sqrt{2}\,(1+i)$$

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
$$\left|\frac{z + 5i}{z - 5i}\right| = 5$$
Describe the above locus in the complex plane.

✏️ **Solution:**

❷ Question 3

Consider the inequality

$$|z + 9i| + |z - 9i| < 25$$

Describe the above locus in the complex plane.

✏️ **Solution:**

❓ Question 4

Solve the following equation for z:

$$e^{5z} = 6i$$

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:

$$\sinh^{-1} z = 3 - 3i$$

✏️ **Solution:**

❓ Question 7

Solve

✏️ **Solution:**

❷ **Question 8**

Solve

✏ **Solution:**

❓ Question 9

Solve

✏️ **Solution:**

❷ Question 10

Using the definition show that

$$f(z) = 7z^2 + 8z - 4$$

is differentiable at all points. Also find the derivative.

✏️ **Solution:**

❷ Question 11

Using the definition, find the derivative of

$$f(z) = \frac{3z - 9}{6z + 8i} \quad \text{at} \quad z = i$$

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🖊 **Solution:**

❓ Question 12

@Q12@

✏️ Solution:

❓ Question 13

@Q13@

✏️ **Solution:**

❷ Question 14

Show that the given function u defined by

$$u(x, y) = 7\sin(9x)\cosh(9y) + 15x^2y - 9x^2 - 5y^3 + 9y^2$$

is harmonic. Find the harmonic conjugate v of u such that $\mathbf{u+vi}$ becomes analytic.

✏️ **Solution:**

❓ Question 15

Show that the given function u defined by

$$u(x, y) = 9xe^{-2x}\cos(2y) + 9ye^{-2x}\sin(2y)$$

is harmonic. Find the harmonic conjugate v of u such that $\mathbf{u+vi}$ becomes analytic.

✏️ **Solution:**