



BRAC University

Department of Mathematics and Natural Sciences

Total Points: 15

 **Assignment-01**

Course Code: MAT215
Complex

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 **Section: 12**

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 **Submission Date: _____**

Assigned by


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Question 1

Find all possible values of z such that

$$z^5 = 16\sqrt{2}(1 + i)$$

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

$$\left| \frac{z + 9i}{z - 9i} \right| = 2$$

Describe the above locus in the complex plane.


 Solution:

Question 3

Consider the inequality

$$|z - 6| - |z + 6| \geq 8$$

Describe the above locus in the complex plane.

 Solution:

Question 4

Solve the following equation for z :

$$e^{3z} = -6$$

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 :

$$\sin^{-1} z = 4 + 9i$$

 Solution:


Question 7

Solve

 Solution:

Question 8

Solve

 Solution:

Question 9

Solve


 Solution:

Question 10

Using the definition show that

$$f(z) = 4z\bar{z} - 7z + 3\bar{z}$$

is not differentiable at $z = 0$.

 **Solution:**

Question 11

Using the definition, find the derivative of

$$f(z) = \frac{4}{6z + 4} \quad \text{at} \quad z = z_0$$

.

 Solution:

Question 12

Consider the function $f(z)$ defined by

$$f(z) = 3 \sinh(6z) - 6 \cos(6z)$$

Using C-R equations determine whether the function is analytic or not.


 **Solution:**

Question 13

Consider the function $f(z)$ defined by

$$f(z) = 8ze^{-4z}$$

Using C-R equations determine whether the function is analytic or not.


 **Solution:**

Question 14

Show that the given function v defined by

$$v(x, y) = 5e^{-6x} \cos(6y) - 5e^{5y} \sin(5x) + 21x^2y - 9x^2 - 7y^3 + 9y^2$$

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


 **Solution:**

Question 15

Show that the given function v defined by

$$v(x, y) = 6xe^{-4x} \cos(4y) + 6ye^{-4x} \sin(4y)$$

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

 **Solution:**