



# **BRAC University**

Department of Mathematics and Natural Sciences

**Total Points: 15**

 **Assignment-01**

**Course Code: MAT215**

Complex

 **Name: MD. ISHTIAQ MOZUMDER**

 **Student ID: 24301219**

 **Section: 12**

 **Semester: FALL 2025**

 **Submission Date: \_\_\_\_\_**

*Assigned by*


 **Partho Sutra Dhor**  
Lecturer, Department of MNS  
BRAC University

### Question 1

Find all possible values of  $z$  such that

$$z^6 = 32\sqrt{2}(1 + i)$$

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

$$|z - 8i| - |z + 8i| = 13$$

Describe the above locus in the complex plane.


 **Solution:**

### Question 3

Consider the inequality

$$|z - 8i| - |z + 8i| \geq 10$$

Describe the above locus in the complex plane.

 Solution:

### Question 4

Solve the following equation for  $z$ :

$$e^{5z} = \frac{3\sqrt{2}(-1+i)}{2}$$

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

 **Solution:**

### Question 5

Prove that

$$\tan^{-1} z = \frac{1}{2i} \ln \left( \frac{1 + iz}{1 - iz} \right),$$

 Solution:

### Question 6


Solve for  $z$ :

$$\sin^{-1} z = 4 + 6i$$

 Solution:

## Question 7


Solve

 Solution:



## Question 8

Solve

 Solution:

## Question 9

Solve


 Solution:

### Question 10

Using the definition show that

$$f(z) = 3z\bar{z} - 9z + 5\bar{z}$$

is not differentiable at  $z = 0$ .

 **Solution:**

### Question 11

Using the definition, find the derivative of

$$f(z) = \frac{7}{z^2} \quad \text{at} \quad z = 4 + 7i$$

.

 Solution:

## Question 12

Consider the function  $f(z)$  defined by

$$f(z) = 3 \sinh(5z) - 4 \cos(9z)$$

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


 **Solution:**

### Question 13

Consider the function  $f(z)$  defined by

$$f(z) = 6|z|^2 + 2z - 4\bar{z}$$

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


 **Solution:**

### Question 14

Show that the given function  $v$  defined by

$$v(x, y) = 9e^{-8x} \cos(8y) - 7e^{6y} \sin(6x) + 12x^2y - 6x^2 - 4y^3 + 6y^2$$

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

$$v(x, y) = 2xe^{-8x} \cos(8y) + 2ye^{-8x} \sin(8y)$$

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

 **Solution:**