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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Assigned by

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Question 1

Find all possible values of z such that

$$z^6 = \frac{729\sqrt{2}\,(-1-i)}{2}$$

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

$$\left|\frac{z+4i}{z-4i}\right| = 3$$

Describe the above locus in the complex plane.

Solution:

Question 3

Consider the inequality

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

Describe the above locus in the complex plane.

Solution:

Question 4

Solve the following equation for z:

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

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

Solution:

Question 5

Prove that

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

Solution:

Question 6

Solve for z:

$$\tanh^{-1} z = 5 - 9i$$

Solution:

Question 7

Solve

Solution:

Question 8

Solve

Solution:

Question 9

Solve

Solution:

Question 10

Using the definition show that

$$f(z) = 4z^2 + 6z - 3$$

is differentiable at all points. Also find the derivative.

Solution:

Question 11

Using the definition, find the derivative of

$$f(z) = \frac{3z-2}{9z+8i} \quad \text{at} \quad z = i$$

.

Solution: