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

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

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

@Q12@

Solution:

Question 13

@Q13@

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 **u+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 **u+vi** becomes analytic.

Solution: