

MAT215: Complex Variables & Laplace Transformations Quiz-01 November 28, 2024 Total - 20 Marks (You need to answer **any four questions including** 1)

Name:

ID:

Section:

- 1. Suppose $f(z) = z^i$, now compute all possible values of f(4). (2)
- 2. Find all the 5-th root of unity and locate them graphically. (6)
- 3. Find the region graphically,

$$1 < |z + i| \le 2$$

(6)

- 4. If f(z) = |z 2i| and g(z) = |z 2i| Prove that, f(z) + g(z) = 6 represents an ellipse. (6)
- 5. Suppose we choose the principal branch of $\tanh^{-1} z$ to be that one for which $\tanh^{-1} 0 = 0$. Prove that,

$$\tanh^{-1} z = \frac{1}{2} \ln \left(\frac{1+z}{1-z} \right) \tag{6}$$

6. Find the solution set of the equation,

$$z^2 + (2i - 3)z + 5 - i = 0$$

(6)

Bonus Question:

1. Find the image of the unit square under the mapping f(z) = (1+i)z + i, (2 Marks)



Figure 1: f(z) = (1+i)z + i

SAME BONUS QUESTION!

Best of Luck!