BRAC UNIVERSITY

Inspiring Excellence

MAT 215

Fall 2020

Assignment 02

SET: E

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*Please write your name and ID on the assignment script. The deadline for submitting the assignment is **3rd November 2020**. Solve **all the problems**. You will receive 5 bonus marks for **submitting your assignment in LaTeX**. **No Late submissions will be accepted**.*

Any information you need to solve this exam are given in the question.

*Be creative, use your intuition. Answer the questions by yourself. Cheating and Copying will lead to **50%** deduction from your total marks in the course and a Zero in the assignment. **Total marks is 50**. Each question carries 10 marks.*

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1. Let, $w = f(z) = u + iv$ is a complex valued function.Now express the following function both Cartesian and Polar form and determine the forms taken by u and v.
$$f(z) = z^2 - z + 2.$$

2. Find the derivative of the following function by using the definition of derivative of complex valued function.
$$f(z) = \frac{1}{1+z}.$$

3. Find $\lim_{z\to 0} \frac{Re(z)^2}{|z|}$. **[Hint: use $z = x + iy$.]**

4. Find $\lim_{z\to 1+i} \frac{z^2 - z + 1 - i}{z^2 - 2z + 2}$.

5. Using the theorems regarding limits going to infinity show that,

$$\lim_{z\to 1} \frac{1}{(z-1)^3} = \infty.$$