

 **NATIONAL OPEN UNIVERSITY OF NIGERIA**

**Plot 91, Cadastral Zone, NnamdiAzikiwe Expressway, Jabi, Abuja.**

**FACULTY OF SCIENCES**

**January\February Examination 2018**

**Course Code: MTH341**

**Course Title: REAL ANALYSIS II Credit Unit: 3**

**Time Allowed: 3 HOURS**

**Instruction: ATTEMPTNUMBER ONE (1) AND ANY OTHERFOUR (4) QUESTIONS**

1. (a) State and prove the Lagrange’s Mean Value theorem **(3 Marks)**

(b) Verify Rolle ’s Theorem for the functions in

(i) in[-2,3] **(5 Marks)**

(ii)in (2,4) **(5 Marks)**

(c) (i) Verify whether or not Rolle’s theorem can be verified for lying in (0,4). **(5 Marks)**

 (ii) What is the point of discontinuity? **(4 Marks)**

1. (a) Separate the intervals in which the polynomialis increasing or decreasing. **(3 Marks)**

(b) (i) Show that, for any   **(5 Marks)**

 (ii) Verify Lagrange’s Mean Value theorem for the functions  in (0, 1/2) **(4 Marks)**

1. (a) Verify Cauchy’s mean value theorem for the functions,  in [1,e] **(6 Marks)**

(b) Calculate approximately by using Lagrange’s Mean Value theorem **(6 Marks)**

1. Evaluate the following limits

(i) as x tends to 2 (ii)  as x tends to 2

(iii) as x tends to zero (iv) as x tends to zero **(3marks each)**

1. (a) Find the first 3 terms in the Taylor series for

 (i)  at x=1 **(3 Marks)**

(ii) at x = -1 **(3 Marks)**

1. Find the first 3 terms in the Maclaurin’s series for (i)  **(2 Marks)**

 (ii)  **(2 Marks)**

 (iii)  **(2 Marks)**

1. (a) (i) Find the nature of the stationary points for the function  **(4 Marks)**

 (ii) Find the maximum and minimum values of , and values of x 

where they occur **(4 Marks)**

1. Find the maximum and minimum values of 

**(4 Marks)**