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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCE**

 **2018\_2 SEMESTER EXAMINATION**

**COURSE CODE: PHY 313**

**COURSE TITLE: MATHEMATICAL METHODS FOR PHYSICS I**

**CREDIT UNIT 3**

**TIME ALLOWED (2½ HRS)**

**INSTRUCTION: *Answer question 1 and any other four questions***

**QUESTION 1**

**a.** Find the residues of  at all its isolated singular points and at infinity

 (if infinity is not a limit point of singular points), where  is given by

  (9 marks)

**b.** If  find . (5 marks)

**c.** If  find  and check if it satisfies the

 Cauchy-Riemann equations. (8 marks)

**QUESTION 2**

1. Find the residues of  at all its isolated singular points and at infinity (if infinity is not a limit point of singular points), where  is given by

  (8 marks)

1. **a.** Evaluate  **** (4 marks)

**QUESTION 3**

 a) Show that**.** (4 marks)

 b) Find the Laurent series about  for the function  (8 marks)

**QUESTION 4**

 **Evaluate the following:**

**a.**  (6 marks)

**b.**  (6 marks)

**QUESTION 5**

a. List all the cube roots of . (6 marks)

b. Evaluate (6 marks)

**QUESTION 6**

**a.** Given that f(*z*) = *y*–2*x**y*+*i*(−*x*+*x*2–*y*2)+*z*2 with *z*= *x*+*i**y*. Find the values of ‘*z*’ for which *f*′(*z*) exists.

 (6 marks)

**b.** Consider the function *g*(*x*+*i**y*) = *x*2–*y*2+2*i**x**y* which has *u*(*x*,*y*) = *x*2–*y*2 and  *v*(*x*,*y*) = 2*x**y*.

 Show that g is an entire function. (6 marks)