



# THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

**A. M. E. C. E. A**

**MAIN EXAMINATION**

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**AUGUST - DECEMBER 2016 TRIMESTER**

**FACULTY OF ARTS AND SOCIAL SCIENCES**

**DEPARTMENT OF SOCIAL SCIENCES**

**REGULAR PROGRAMME**

**SEC 309: MATHEMATICS FOR ECONOMISTS**

**Date: DECEMBER 2016**

**Duration: 2 Hours**

**INSTRUCTIONS: Answer Question ONE and ANY other TWO Questions**

Q1. a) **Maximise Utility**=  $U = 10X_1^2 + 15X_2^4 - 21X_1^2X_2$

**Subject to:** Income of Ksh. 100; Price of  $X_1 = Ksh. 4$  and Price of  $X_2 = Ksh. 3$

**(10 Marks)**

b) Discuss the relationship among slope, derivative and rate of change

**(10 Marks)**

Q2. a) Differentiate the function  $Y = (X^2 + 5X)$

**Note:** State your assumptions clearly

**(10 Marks)**

b) State the rule you applied above

**(2 Marks)**

c) Using an example, discuss the concept of comparative statics

**(8 Marks)**

Q3. a) Evaluate the following integrals

a)  $\int_1^2 X(X^3 - 5)dX$

**(8 Marks)**

b)  $\int (Z - 3)^2 dZ$

**(5 Marks)**

c)  $\int_3^4 (2T - 3)dT$

**(7 Marks)**

Q4. A monopolist is faced by the following functions:  
Production=  $Q = 200 - L^2 - K^2$  and Cost=  $C = 2L + 3K$ . Where K= Capital and L= Labor

a) Determine the optimum values for Capital and Labor (15 Marks)

b) If  $z = f(X, Y)$  and  $Z = X^2 - XY + Y^2$  where  $k=3$  (5 Marks)

Q5. Using the following set of equations, discuss the inverse of a matrix

i)  $3X + 2P - 5Z = -20$

ii)  $5X - P + Z = 50$

iii)  $X + Z = 16$

(20 Marks)

**\*END\***