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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE**

**Biological, Construction Management, Renewable Energy, Agribusiness Management, Food Security, Horticulture, Animal Science and Agricultural Education and**

**Extension**

**1ST YEAR 2ND SEMESTER 2016/2017 ACADEMIC YEAR**

**COURSE CODE: SMA 3121**

**COURSE TITLE: MATHEMATICS II**

**EXAM VENUE: AUDITORIUM STREAM: (Bachelor of Science)**

**DATE: 26/04/2017 EXAM SESSION: 2.00 – 4.00 PM**

**TIME: 2.00 HOURS**

**Instructions:**

1. **Answer question 1 (Compulsory) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE (30 marks)**

1. A line passes through the points A(4,5) and B(-2,7)
2. Determine the equation of the line (2 marks)
3. Determine the length of . (2 marks)
4. Determine the equation of , the perpendicular bisector to AB (2 marks)
5. Use the cramers rule to solve. (5 marks)

 3x + 2y = 12

 4x – y =5

1. Find the derivative of . (3 marks)
2. Find Lim

 x→1 (5 marks)

1. Find the determinant of the matrix . (4 marks)
2. Find the value of the unknown if the matrix

 is a singular matrix. (5 marks)

**QUESTION TWO (20 marks)**

1. Find . (5 marks)
2. Solve the system of linear equations below using Cramer’s Rule.

x - 3z = -2

3x + y - 2z = 5

2x + 2y + z = 4. (10 marks)

1. A line passes through the point (2,-3) and is perpendicular to the line

 . Determine the equation of the line (5 marks)

**QUESTION THREE (20 marks)**

1. Calculate the shaded area in the figure below.

-3

y = x3

1. The displacement of a particle after t seconds is given by

S=40t3– t2 - 3t +3. Find the.

1. Velocity of the particle when t=2 seconds. (4 marks)
2. Acceleration of the particle when t=3 seconds. (3 marks)
3. i) Maximum displacement. (3 marks)
4. Minimum velocity of the particle. (3 marks)

**QUESTION FOUR (20 marks)**

1. Determine the points of discontinuities of the function . Hence or otherwise find (7 marks)

1. Evaluate . (4 marks)
2. As blood moves from the heat through major arteries out to the capillaries and back through the veins, the system blood pressure continuously drops. Consider a person whose systolic blood pressure P. (in millimeters of mercury) is given by.

P= , 0 ≤ t ≤ 10

where t is measured in seconds. At what rate is the blood pressure changing 5 seconds after blood leaves the heart. (8 marks)

**QUESTION FIVE (20 marks)**

1. Given that , determine the minima and the maxima. (8 marks)
2. Given a system of linear equations

 .

1. Express the system in the form of matrix equation  where is a  matrix of coefficients of the variables  and is a suitable column matrix**.** (2 marks)
2. Determine the adjoint of the matrix (5 marks)
3. Hence solve the system of equations using the adjoint**.** (5 marks)