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JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

# **UNIVERSITY EXAMINATIONS 2014/2015**

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE /

BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE

**SMA 2200 : CALCULUS III**

**DATE: APRIL 2015 TIME: 3 HOURS**

**INSTRUCTIONS:**

**ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

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**QUESTION ONE [30 MARKS]**

1. Define the following
2. Limits
3. Continuity
4. Differentiability

For a real valued function f(x)

Hence show that the functions

 is continuous but not differentiable of x=0. [3, 4 marks]

1. Determine if the following series is convergent of divergent

 [5 marks]

1. Find the Taylor series about x=0 for the integral  [5 marks]
2. At what points do the graphs of  and  intersect. [4 marks]
3. Evaluate the improper integral  [4 marks]
4. Given the , evaluate  [4 marks]

**QUESTION TWO [20 MARKS]**

1. Show that the functions  satisfies the two dimensional Laplase equation  [5 marks]
2. Use change of variables to evaluate the improper integral over the first guardant. [7 marks]
3. Evaluate  by applying the transformation  and  and integrating over an appropriate region in the uv – plane. [8 marks]

**QUESTION THREE [20 MARKS]**

1. Given that  and  find  at t=0. [6 marks]
2. Find the firs three non-zero terms of the Taylor series for  about x=0. [7 marks]
3. Determine if the following series converge or diverge. If it does converge, then find its value  [7 marks]

**QUESTION FOUR [20 MARKS]**

1. A thin plate covers a triangular region bounded by the x-axis, the lines x=1 and y=2x in the firs quadrant. If the density of the plate is  find the mass, center of mass, moment of inertia and radii of gyration about the co-Coordinate axes [12 marks]