

**KABARAK**



**UNIVERSITY**

**EXAMINATIONS**

**2008/2009 ACADEMIC YEAR**

**FOR THE DEGREE OF BACHELOR OF EDUCATION  
SCIENCE**

**COURSE CODE: MATH 121**

**COURSE TITLE: CALCULUS**

**STREAM: SESSION II & VI**

**DAY: THURSDAY**

**TIME: 2.00 – 4.00 PM**

**DATE: 26/11/2008**

---

**INSTRUCTIONS:**

**Answer question ONE and any other TWO**

**PLEASE TURN OVER**

**QUESTION ONE (30 MARKS)**

- a) Use the trapezoidal rule with  $n = 4$  to estimate the following integral and compare with the exact value

$$\int_1^2 x^2 dx$$

(5 marks)

- b) Evaluate the following integrals

i)  $\int \cos(7\theta + 5) d\theta$

ii)  $\int \sqrt{\tan x} \sec^2 x dx$

(9 marks)

iii)  $\int x e^{-x^2} dx$

- c) Evaluate the following inverse functions

i)  $y = \sin^{-1} 2x$

ii)  $y = \tan^{-1} 2x$

(6 marks)

- d) Integrate the following function by parts

$$\int x \cos x dx$$

(5 marks)

- e) Find the volume of a solid generated by revolving the region between the parabola  $x = y^2 + 1$  and the line  $x = 3$  about the line  $x = 3$

(5 marks)

**QUESTION TWO(20 MARKS)**

- a) Find the integrals of the following by parts

i)  $\int e^x \cos x dx$

(6 marks)

ii)  $\int x^2 e^{2x} dx$

(6 marks)

- b) Find the integral of  $\int \frac{dx}{4x^2 + 4x + 2}$

(5 marks)

- c) Find  $\frac{\partial x}{\partial y}$  if  $f(x,y) = y \sin xy$

(5 marks)

**QUESTION THREE (20 MARKS)**

a) Evaluate  $I_n = \int \sin^n x dx$  (10 marks)

b) Approximate  $\int_0^2 \frac{1}{x^2 + 1}$  with  $n = 4$  using

i) Trapezoidal Rule (5 marks)

ii) Simpson's Rule (5 marks)

**QUESTION FOUR (20 MARKS)**

a) Evaluate  $I_n = \int \frac{-2x + 4}{(x^2 + 1)(x - 1)^2}$  (12 marks)

b) Evaluate  $\int 3x^2 \sqrt{x + 4} dx$  (8 marks)

**QUESTION FIVE (20 MARKS)**

a) Find the area of the region enclosed by the parabola  $y = 2 - x^2$  and the line  $y = -6$  (4 marks)

b) Find the length of the curve  $y = \left(\frac{x}{2}\right)^{\frac{2}{3}}$  from  $x = 0$  to  $x = 2$  (5 marks)

c) Evaluate

i)  $\int \cos^5 \theta d\theta$  (8 marks)

ii)  $\int \cos^2 \theta d\theta$  (3 marks)