



# MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATIONS 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SMA 200: CALCULUS II

DATE: 2/5/2019

TIME: 8:30 – 10:30 AM

---

**INSTRUCTION:** Answer Question *ONE* which is compulsory

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Find  $\int \sin^6 x \cos^3 x dx$  (5 marks)
- b) Find  $\int \tan^3 x \sec^4 x dx$  (5 marks)
- c) Determine the area of the region enclosed by  $y = x^2$  and  $y = \sqrt{x}$  (5 marks)
- d) Find  $\int \cos(4x) \cos(3x) dx$  (5 marks)
- e) Find  $\int x^2 \sin x dx$  (5 marks)
- f) Determine the volume of the solid obtained by rotating the region bounded by  $y = x^2 - 2x$  and  $y = x$  about the line  $y = 4$  (5 marks)

## QUESTION TWO (20 MARKS)

- a) Evaluate the integral  $I = \int_0^1 \frac{dx}{1+x^2}$  using Simpson's rule using 6 equal sub intervals (5 marks)
- b)  $\int_0^1 \frac{x^3+1}{x^3-1} dx$  (7 marks)
- c)  $\int_0^1 \frac{x^3}{(x-1)(x-2)(x-3)} dx$  (8 marks)

### QUESTION THREE (20 MARKS)

- a) Find  $\int \sin^6 x \, dx$  (5 marks)
- b) Find  $\int \frac{1+x^2}{\sqrt[4]{3x+x^3}} dx$  (5 marks)
- c) Determine the area of the region bounded by  $y = xe^{-x^2}$ ,  $y = x + 1$ ,  $x = 2$ , and the  $y$ -axis. (5 marks)
- d) Evaluate the integral  $I = \int_0^1 \frac{dx}{1+x}$  using Simpson's rule using 4 equal sub intervals (5 marks)

### QUESTION FOUR (20 MARKS)

- a) Determine the volume of the solid obtained by rotating the region bounded by  $y = x^2 - 4x + 5$ ,  $x = 1$ ,  $x = 4$ , and the  $x$ -axis about the  $x$ -axis. (5 marks)
- b) Find  $\int \tan^5 x \, dx$  (5 marks)
- c) Find  $\int \frac{dx}{\sqrt{9-x^2}} dx$  (5 marks)
- d) Find  $\int \frac{1}{1+\sin^2 x} dx$  (5 marks)

### QUESTION FIVE (20 MARKS)

- a) Find  $\int \frac{1}{1+\cos x} dx$  (5 marks)
- b) Find  $\int \frac{5x+7}{x^2+4x+8} dx$  (5 marks)
- c) Find  $\int \frac{3x-5}{(x+1)^2(3x-2)} dx$  (5 marks)
- d) Evaluate the integral  $I = \int_0^1 \frac{dx}{1+x}$  using trapezoidal rule using 4 equal sub intervals (5 marks)