



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)