



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

**FIRST YEAR SECOND SEMESTER EXAMINATION FOR, BACHELOR OF
SCIENCE APPLIED STATISTICS AND PROGRAMMING, BACHELOR OF
MATHEMATIS AND ECONOMICS**

AMM 104 –CALCULUS 11

DURATION: 2 HOURS

DATE: 25/4/2019

TIME: 2:00-4:00

Instructions to candidates:

1. Answer question One and Any Other Two questions
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- a) Evaluate $\int_1^3 (X^2 - 1)dx$ 3mks
- b) Evaluate $\int_1^2 2e^{5x}dx$ correct to five significant figures 3mks
- c) Show that $\int \tan\theta d\theta = \ln \sec \theta + c$ 4mks
- d) Find $\int \frac{d\theta}{1+\cos \theta}$ 3mks
- e) Determine $\int_0^1 2x e^{3x} dx$ 4mks
- f) Find the area bounded by x-axis, y-axis, the curve $y = e^x$ and the line $x = 2$ 3mks
- g) Find the volume generated by rotating the area bounded by $y = 2x$, $y = 6$ and $x = 0$ and y axis 3mks
- h) Evaluate $\int_0^{\ln} \frac{dx}{\cosh x + 3\sinh x + 1}$ 3mks

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

- a) Integrate xe^x with respect to x 3mks
- b) Resolve $\frac{4-2x}{(x^2+1)(x+1)^2}$ into partial fractions hence integrate with respect to X 7mks
- c) Evaluate $\int_0^1 \frac{1}{9+4x^2}$ correct to four significant figures 5mks
- d) Evaluate $\int_0^3 3x\sqrt{3x^2 + 9}$ taking positive roots only 5mks

QUESTION THREE (20 MARKS)

- a) Obtain reduction formula for $I_n = \int \sin^n x dx$, hence evaluate $\int \sin^4 x dx$ 6mks
- b) Calculate $\iint_R f(x, y) dA$ for $f(x, y) = 1 - 6x^2$ and R $0 \leq x \leq 2, -1 \leq y \leq 1$ 5mks

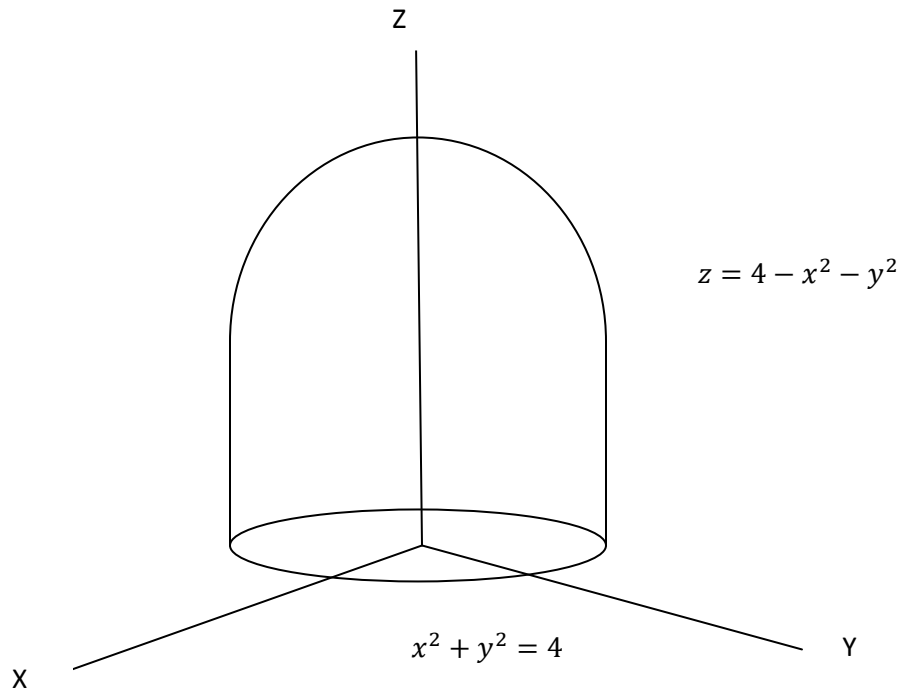
c) Find the Taylor series generated by $f(x) = 1/x$ at $x = 0$ and when the series converges 5mks

d) Determine $\int x \sin x dx$ 4mks

QUESTION FOUR (20 MARKS)

a) Find the average value of $f(x,y,z) = xyz$ over the cube bounded by the coordinate planes and the planes $x=2$, $y=2$ and $z =2$ in the first octant. 6mks

b) Find the center of mass of a solid of constant density δ bounded below by the disk $R: X^2+Y^2 \leq 4$ in the plane $Z=2$ and above by the paraboloid $Z=4-X^2-Y^2$ 7mks



c) Use the trapezium rule with five ordinates to evaluate $\int^{0.8} e^{x^2} dx$ 5mks

d) Evaluate $\int (x^2-2x+5) dx$ 2mks