Integral Calculus (MATH-106)

MT Exam _____   Spring 2021

Date: March 31, 2021   **Maximum Marks:** 30

Note: Time for this exam is 120 minutes. Attempt all FOUR questions and give detailed solutions.

Question 1:$(2° + 3° + 2°)$

a Use Simpson's rule, with $n = 4$, to approximate $\int_0^4 \sqrt{8 + x^3}\, dx$

b Evaluate the integral $\int \frac{e^x \ln(1+e^x)\, dx}{e^x+1}$

c Find $\frac{dy}{dx}$ if $y = (1 + x^2)^{2x+1}$

Question 2:$(3° + 2° + 3°)$

a Evaluate the integral $\int \frac{2^x\, dx}{4-4^x}$

b Compute the integral $\int \frac{x^4\, dx}{\sqrt{x^{10}-1}}$

c Find the value of the indefinite integral $\int \frac{dx}{x\sqrt{1-x^6}}$

Question 3:$(3° + 2° + 3°)$

a Compute $\lim_{x \to \infty} (1 + 3x)^{\frac{1}{x}}$

b Evaluate the integral $\int e^x \sin 4x\, dx$

c Find the value of the indefinite integral $\int \cos^5 x \sin^4 x\, dx$

Question 4:$(3° + 3°)$

a Evaluate the integral $\int x^3 \sqrt{x^2 - 4}\, dx$

b Evaluate the integral $\int \frac{2x^2-11x+9}{x^3-6x^2+9x}\, dx$

—- Good Luck —-