

Midterm exam106

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 $\int \frac{e^x \ln(e^x + 1) dx}{e^x + 1}$

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

Question 2(3+2+3)

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

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

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

Question 3(3+3+3)

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

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

c) Find $\int (\cos x)^5 (\sin x)^4 dx$

Question 4(3+3)

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

b) Compute the indefinite integral $\int \frac{2x^2 - 11x + 9}{x^3 - 6x^2 + 9x} dx$