

King Saud University
Faculty of Sciences
Department of Mathematics

Midterm2

Math 106

November 2023

Question 1 : (3+3+3)

1. Find $\lim_{x \rightarrow 0^+} (e^{-2x} - 2x)^{\frac{1}{x}}$.
2. Compute $\int (x^5 + 1) \ln x dx$.
3. Evaluate the integral $\int \sin^5 x \cos^8 x dx$.

Question 2 : (2+3+3)

1. Compute $\int \frac{\cos(2x)}{\sec(5x)} dx$.
2. Find the indefinite integral $\int \frac{3x + 1}{(4 + x^2)^{\frac{3}{2}}} dx$.
3. Evaluate $\int \frac{x^2}{x^2 - x - 2} dx$.

Question 3 : (2+3+3)

1. Evaluate the integral $\int \frac{dx}{\sqrt{x^2 + 6x + 13}}$.
2. Compute $\int \frac{dx}{4x^{\frac{2}{3}} + x^{\frac{4}{3}}}$.
3. Does the integral $\int_0^{+\infty} \frac{e^{-x}}{(1 + e^{-x})^2} dx$ converge?
Find its value if it does..