

King Saud University
Faculty of Sciences
Department of Mathematics

Midterm Exam-2

Math 106

November 2024

Question 1 : (3+3+3)

a) Find $\lim_{x \rightarrow 0^+} (1 + 4x)^{\cot x}$.

b) Integrate by parts twice to find $\int x(\ln x)^2 dx$.

c) Compute $\int \sec^7 x \tan^5 x dx$.

Question 2 : (3+3+2)

a) Evaluate $\int x^3(1 - x^2)^{\frac{5}{2}} dx$.

b) Find $\int \frac{dx}{(x^2 - 2x + 2)(x - 1)}$.

c) Compute $\int \frac{dx}{\sin x - \cos x}$.

Question 3 : (2+3+3)

a) Find $\int \frac{dx}{\sqrt{x^2 - 4x}}$.

b) Compute $\int \frac{dx}{\sqrt{x^{\frac{4}{7}} - x^{\frac{9}{7}}}}$.

c) Does the integral $\int_1^{+\infty} \frac{dx}{x(1 + (\ln x)^2)}$ converge? Find its value if it does.