

Question 1: (Substitution Method)

(a) Determine $\int e^{2x} \sin(e^{2x}) dx$.

[3]

(b) Determine $\int \frac{\cos(x)}{1 + \sin^2(x)} dx$.

[3]

(c) Evaluate $\int_e^{e^2} \frac{1}{x\sqrt{\ln x}} dx$.

[4]

Question 2: (Integration by Parts)

(a) Evaluate $\int_0^1 (x^2 + 1)e^x dx$.

[5]

(b) Determine $\int \sin(\ln x) dx$.

[5]

Question 3: (Trigonometric Integrals)

(a) Evaluate $\int_0^{2\pi} \cos^2(\theta/4) d\theta$.

[5]

(b) Determine $\int \tan^5(x) \sec^3(x) dx$.

[5]

Question 4: (Trigonometric Substitution) Determine

$$\int \frac{1}{x^2 \sqrt{x^2 + 9}} dx$$

Question 5: (Partial Fractions) Determine

$$\int \frac{x^2 + 3x + 2}{x(x^2 + 1)} dx$$