

**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

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

[10]

**Question 5:** (Partial Fractions) Determine

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

[10]