

1. Evaluate each integral

$$(a) \int \frac{\ln(\ln x)^4}{x} dx$$

$$(b) \int e^{(x-3e^x)} dx$$

$$(c) \int (\sqrt{x-2})^{13} dx$$

$$(d) \int x\sqrt{x+2} dx$$

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

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

$$(g) \int \frac{x-1}{x^2-2x+10} dx$$

$$(h) \int \frac{\cos x dx}{\sqrt{4 \sin x - \sin^2 x}}$$

2. Set up the form of the partial fraction decomposition. Evaluate the coefficients for (b) and (c) only.

$$(a) \frac{5}{x^2(x^2-16)(x^2+x+6)}$$

$$(b) \frac{4x^2+5x+7}{4x^2+8x+3}$$

$$(c) \frac{x^2}{(x^2+1)^2(x-1)}$$

3. Use the Midpoint Rule, the Trapezoidal Rule and Simpson's Rule each with $n = 4$ to estimate the integral $\int_0^4 \frac{dx}{1+x}$. Leave each of your answers as a (numerical) sum. Estimate the error.

4. Textbook, p. 487 34; p. 512 30.

5. Determine whether the following integrals are convergent or divergent. Evaluate those that are convergent.

$$(a) \int_1^{\infty} \frac{1}{(x+1)^4} dx$$

$$(b) \int_{-1}^3 \frac{1}{x^4} dx$$

$$(c) \int_0^{\infty} xe^{-5x} dx$$

$$(d) \int_2^{\infty} \frac{x}{\sqrt{x^3-1}} dx$$

6. Solve the differential equations

$$\frac{dy}{dx} = \frac{3x - \cos x}{2y}$$

$$y' = e^{x-y}$$

$$\frac{dy}{dx} = 2x + 3$$

7. Using the table of integrals in the back of the book compute

$$\int (x+3)^2 \sin(x-1) dx$$

$$\int (x^2+2x)\sqrt{x^2+2x} dx$$