

Name: _____

Total: 115 points

Show all work. Remember the constant of integration and use absolute values where appropriate.

1. (12 points) For each integral, state the technique you would use to **start** the problem. Do **not** evaluate the integral.

(a) $\int w \ln(w) dw$

(b) $\int 8 \sin^2(x) \cos^3(x) dx$

(c) $\int \frac{x^2}{\sqrt{49 - x^2}} dx$

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

(e) $\int \frac{x}{\sqrt{x^2 - 5}} dx$

(f) $\int \frac{4e^{2x}}{e^{2x} + 14e^x + 45} dx$

2. (9 points) Write out the **form** of the partial fraction decomposition of each integrand. Do **not** solve for the coefficients and do **not** evaluate the integral.

(a) (3 points) $\int \frac{x^5 + 64}{(x^2 - x)(x^4 + 16x^2 + 64)} dx$

(b) (3 points) $\int \frac{x^2}{x^2 + x - 20} dx$

(c) (3 points) $\int \frac{26}{(x - 1)(x^2 + 25)} dx$

3. (8 points) Evaluate the integral.

$$\int (x^2 + 7x) \cos(x) \, dx$$

4. (10 points) Evaluate the integral.

$$\int e^{8\theta} \sin(9\theta) \, d\theta$$

5. (7 points) Evaluate the integral.

$$\int_0^{\pi/2} \sin^3(y) \cos^4(y) dy$$

6. (7 points) Evaluate the integral.

$$\int \tan^3(x) \sec^6(x) dx$$

7. (6 points) For each integral, state the trigonometric substitution you would use to get started. Do **not** evaluate the integrals.

(a) (2 points) $\int \frac{x^3}{\sqrt{16+x^2}} dx$

(b) (2 points) $\int \frac{\sqrt{4x^2-25}}{x} dx$

(c) (2 points) $\int \frac{\sqrt{x^2-9}}{x^4} dx$

8. (10 points) Choose **one** of the three integrals from Question 7 and evaluate it completely. Include a labeled right triangle and write your final answer in terms of x .

I am solving part: _____

9. (9 points) Evaluate the integral.

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

10. (8 points) Make a substitution to express the integrand as a rational function, and then evaluate the integral.

$$\int_2^4 \frac{dx}{x\sqrt{x-1}}$$

11. (4 points) Determine whether the integral is convergent or divergent. If it is convergent, evaluate it.

$$\int_1^{\infty} 4x^{-5} dx$$

12. (10 points) Determine whether the integral is convergent or divergent. If it is convergent, evaluate it. Use proper limit notation.

$$\int_1^{\infty} \frac{\ln(x)}{x^2} dx$$