

Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has six (6) pages, including this one.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

Page	Max. points	Your points
2	40	
3	20	
4	10	
5	10	
6	20	
Total	100	

Problem 1 (40 pts). Evaluate each integral:

(a) $\int \csc^2 x \, dx =$

(b) $\int \frac{1}{\sec x} \, dx =$

(c) $\int \frac{1-x}{x} \, dx =$

(d) $\int \frac{x}{x+2} \, dx =$

Problem 2 (10 pts). Use **integration by parts** to evaluate the integral $\int x e^{3x} dx$.

$$\int x e^{3x} dx =$$

Problem 3 (10 pts). Evaluate the improper integral $\int_1^{\infty} \frac{dx}{x^4}$.

$$\int_1^\infty \frac{dx}{x^4} =$$

Problem 4 (10 pts). Use a **trigonometric substitution** to evaluate the integral $\int \frac{dx}{\sqrt{x^2 - 4}}$.

$$\int \frac{dx}{\sqrt{x^2 - 4}} =$$

Problem 5 (10 pts). Evaluate the integral $\int \sin^2 x \cos^2 x \, dx$.

Use trigonometric simplification and one of the following reduction formulas.

$$\begin{aligned}\int \sin^n x \, dx &= -\frac{1}{n} \sin^{n-1} x \cos x + \frac{n-1}{n} \int \sin^{n-2} x \, dx \\ \int \cos^n x \, dx &= \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} \int \cos^{n-2} x \, dx\end{aligned}$$

$$\int \sin^2 x \cos^2 x \, dx =$$

Problem 6 (20 pts). Use **partial fractions** to evaluate the integral $\int \frac{dx}{x^2 + 4x - 5}$.

$$\int \frac{dx}{x^2 + 4x - 5} =$$