

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.

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Page	Max. points	Your points
2	40	
3	20	
4	10	
5	10	
6	20	
<b>Total</b>	100	

**Problem 1** (40 pts). Evaluate each integral:

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

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

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

(d)  $\int \frac{x}{x+1} \, dx =$

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

$\int x e^{2x} dx =$

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

$$\int_1^\infty \frac{dx}{x^3} =$$

**Problem 4** (10 pts). Use the trigonometric substitution  $x = a \sec \theta$  to evaluate the integral

$$\int \frac{dx}{\sqrt{x^2 - 9}}.$$

$$\int \frac{dx}{\sqrt{x^2 - 9}} =$$

**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  $\int \frac{dx}{x^2 + x - 2}$ .

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