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) $\int \dfrac{1}{\csc x} \, dx =$

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

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

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

$$\int xe^{2x}\,dx = \boxed{}$$

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

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

Problem 4 (10 pts)**.** Use a **trigonometric substitution** to evaluate the integral $\int \frac{dx}{\sqrt{x^2-9}}$.

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

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.

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

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

$$\int \sin^2 x \cos^2 x \, dx = \boxed{}$$

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

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