

Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has seven (7) 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	20	
3	20	
4	10	
5	10	
6	20	
7	20	
Total	100	

Problem 1 (20 pts — 5 points each). 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 integral $\int \cos^2 x \, dx$.

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

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 $\int \sin 2x \cos 5x \, dx$.

You may find useful one of the following formulas.

$$\sin A \sin B = \frac{1}{2} [\cos(A - B) - \cos(A + B)]$$

$$\sin A \cos B = \frac{1}{2} [\sin(A - B) + \sin(A + B)]$$

$$\cos A \cos B = \frac{1}{2} [\cos(A - B) + \cos(A + B)]$$

$$\int \sin 2x \cos 5x \, dx =$$

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

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

Problem 7 (20 pts — 10 points each). Evaluate the integrals below

(a) $\int_0^\infty \frac{\sin(\frac{\pi}{2}e^{-x})}{e^x} dx$

(b) $\int_0^{\pi^2/4} \frac{\cos \sqrt{t}}{\sqrt{t}} dt$