Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.

- The test has eight (8) pages, including this one, and two pages of scratch paper (pages 7, 8).

- It also has a formula sheet attached. **You may detach this formula sheet only when prompted to do so. Failure to comply will result in losing the privilege to use it.**

- Enter your answers in the boxes 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	20	
5	20	
6	20	
Total	100	

Problem 1 (5 pts). Evaluate the integral $\int xe^x\,dx$.

Problem 2 (5 pts). Evaluate the integral $\int (x-3)\sqrt{x^2-6x+5}\,dx$.

Problem 3 (5 pts). Evaluate the integral $\int \sin^2 x \cos^3 x\,dx$.

Problem 4 (5 pts). Evaluate the integral $\int \dfrac{x^3+1}{(x+1)^2(x^2+4)}\,dx$.

Problem 5 (10 pts). Evaluate the following integral, or indicate if it is divergent: $\displaystyle\int_0^\infty \frac{x \tan^{-1} x}{(1 + x^2)^{3/2}}\, dx$.

Problem 6 (10 pts). Find the volume of the solid obtained by rotating the region bounded by $y = e^{-x}$, $y = 1/e$, and $x = 0$ around the line $y = 0$.

Problem 7 (10 pts). Find the general term of the sequence $\left\{ 3, 2, \frac{5}{3}, \frac{3}{2}, \frac{7}{5}, \frac{4}{3}, \ldots \right\}$, and compute its limit.

Problem 8 (5 pts—all or nothing). Compute the limit of the sequence $\left\{ \dfrac{n^2 + 5n + 2}{n^2 + 2n} \right\}_{n=1}^{\infty}$

Problem 9 (5 pts). Find a power series representation of the function $f(x) = x^2 \cos(2x)$

Problem 10 (10 pts)**.** Study the convergence of the series $\displaystyle\sum_{n=2}^{\infty} \frac{3^n + 4^n}{5^n}$. If convergent, evaluate the sum.

$$\boxed{}$$

$$\boxed{}$$

Problem 11 (10 pts)**.** Classify the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n}{e^n}$ as absolutely convergent, conditionally convergent, or divergent.

$$\boxed{}$$

Problem 12 (10 pts). Find the interval of convergence of the power series $\sum_{n=0}^{\infty} \dfrac{(-3)^n x^n}{\sqrt{n+1}}$.

$$\boxed{}$$

Problem 13 (10 pts). Express the function $f(x) = \dfrac{2x}{x^3 + 8}$ as a power series.

$$\boxed{}$$

Scratch paper

Scratch paper