Your Name

Instructor Name

Start Time

End Time

Page	Total Points	Score
2	16	
3	16	
4	16	
5	20	
6	20	
7	12	
Total	100	

- You will have 60 minutes to complete the test.
- This test is closed notes and closed book and you may not use a calculator.
- Label any diagrams so as to indicate axes labels and scale.
- In order to receive full credit, you must **show your work.** Please write out your computations on the exam paper.
- Simplify all answers by fully distributing any constants.
- **PLACE A BOX AROUND** $\boxed{\textbf{YOUR FINAL ANSWER}}$ **to each question** where appropriate.

(16 points, 8 points each) Evaluate the following integrals.

1. $\int x \sin(3x)\, dx$

2. $\int \frac{x}{\sqrt{25x^2+1}}\, dx$

(16 points, 8 points each) Evaluate the following integrals.

3. $\int \sin^2(3\theta)d\theta$

4. $\int_0^{1/2} \tan^{-1}(2x)\,dx$

(16 points, 8 points each) Evaluate the following integrals.

5. $\displaystyle\int \frac{\sqrt{x^2-16}}{x}\,dx$

6. $\displaystyle\int \frac{\sin^5 x}{\cos x}\,dx$

7. (4 points) Write out the form of the partial fraction decomposition of the function $f(x) = \dfrac{x-3}{x^3(x-1)(x^2+1)^2}$. **Do not determine the numerical values of the coefficients.**

(16 points, 8 points each) Evaluate the following integrals.

8. $\displaystyle\int \frac{2}{(x-1)(x^2+4)}\,dx$

9. $\displaystyle\int \frac{e^{2x}}{e^{2x}-7e^x+12}\,dx$

10. (4 points) Is the definite integral $\int_0^2 \frac{dx}{x^2+x-2}$ proper or improper? Why? Be specific. **You do not need to determine whether the integral converges or diverges.**

(16 points, 8 points each) Determine whether each integral is convergent or divergent. Evaluate those that are convergent. Clearly explain why the integral diverges, if applicable.

11. $\int_0^\infty xe^{-x^2}dx$

12. $\int_4^5 \frac{6}{(x-4)^3}dx$

13. Set up an expression that approximates the integral $\int_0^2 x^2 \cos(x^2)dx$ with $n = 4$ using the technique specified below. Simplify your expressions as much as possible.

(a) (4 points) Midpoint Rule.

(b) (4 points) Simpson's Rule.

(c) (4 points) Approximate the error, E_M, involved in the approximation from part (a) above. Note $f''(x) = 10x^2\cos(x^2)+2\sin(x^2)-4x^4\sin(x^2)$ and $|E_M| \leq \dfrac{K(b-a)^3}{24n^2}$ where $|f''(x)| \leq K$ for $a \leq x \leq b$. A graph of $f''(x)$ is given below. Begin by sketching $|f''(x)|$ on the grid and using this to provide a reasonable estimate for K.