

MATH 2260

Midterm Exam II

October 14, 2008

NAME (please print legibly): _____

Your University ID Number: _____

Please complete all questions in the space provided. Draw a box around your final answer. You may use the backs of the pages for extra space, or ask me for more paper if needed. Work carefully, and neatly (part of your grade will be based on how well your work is presented).

Try to complete the problems you find easier before going back to the harder ones. Good luck!

QUESTION	VALUE	SCORE
1	10	
2	10	
3	10	
4	10	
5	20	
6	10	
TOTAL	70	

1. (10 points) Find the integral

$$\int x \sec^2 x \, dx.$$

2. (10 points) Find the integral

$$\int \sin^4 x \cos^3 x \, dx.$$

3. (10 points) Find the integral

$$\int \sqrt{25 - x^2} \, dx.$$

4. (10 points) Find the integral

$$\int \frac{x^2}{(x-1)(x^2-1)} dx.$$

Hint: Be careful. This may be a little more tricky than it looks.

5. (20 points) This question has three parts:

1. Use Simpson's rule with $n = 4$ to obtain an estimate for the integral

$$\int_1^2 \frac{1}{x^2} dx.$$

2. What is the true value of the integral? What is the error in your estimate?
3. What value of n would result in an error less than 10^{-8} ? To get credit, you must justify your answer using the error estimate for Simpson's rule.

Continue your work on the Simpson's rule problem on this page if needed.

6. (10 points) Find the improper integral

$$\int_1^{\infty} \frac{1}{x\sqrt{x^2-1}} dx.$$

Hint: The integral converges, so your answer should be a number. Second hint: Remember that the trick for integrating $\sec x$ and $\csc x$ is to multiply by $(\sec x + \tan x)/(\sec x + \tan x)$ or $(\csc x + \cot x)/(\csc x + \cot x)$.