MATH 2260

Midterm Exam II

March 5, 2013

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 (2 points on every problem are given for clear presentation of your work or deducted for unclear, messy, or hard-to-understand work).

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	10	
6	25	
TOTAL	75	

1. (10 points) Solve the differential equation

$$\frac{dy}{dx} = \frac{3x^2}{e^y}$$

for the function $y(x)$.

2. (10 points) Find the integral

$$\int x \ln x \, dx.$$

3. (10 points) Find the integral

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

4. (10 points) Find the integral

$$\int \sin 2x \cos 3x \, dx.$$

5. (10 points) Find the integral
$$\int \frac{3t^2 + t + 4}{t^3 + t} \, dt.$$

6. (25 points) Consider the integral

$$\int_1^2 \ln x \, dx.$$

The following questions are **each** worth 5 points:

1. Set $n = 4$ (4 intervals) and make a table of values for

$$f(a), f(a + h), \ldots, f(a + (n - 1)h), f(b).$$

   Use these values to estimate the integral using the trapezoid rule.

2. Find a bound for the error in this estimate using the error bound for the trapezoid rule.

3. Use the table of values for $f(a), f(a+h), \ldots, f(a+(n-1)h), f(b)$ from part 1 to estimate the integral using Simpson's rule with $n = 4$.

4. Find a bound for the error in this estimate using the error bound for Simpson's rule.

5. Compute the integral **either** by using integration by parts (hard) or remembering it from the Anki cards (easy). Compare your error estimates from parts 2 and 4 to the actual error in your integral estimates in parts 1 and 3.