Math 158 Wednesday, February 5, 2003

Instructor: Murray Martin **Midterm #1 Examination** 17:30-19:00 C9001

This examination has 7 questions, worth a total of 40 marks.

Last Name (Please print): _____

First Name: _____

Student Number: _____

Instructions

1. **Time:** 90 minutes
2. Fill in the information above.
3. Please do not open the examination booklet until you are told to do so
4. Attempt all questions.
5. **Full marks will not be given unless appropriate work is shown.**
6. The last page should be torn-off and used for rough work.
7. You may use pen or pencil to write the exam. However, exams written in pencil are not eligible for remarking.
8. No graphing calculators allowed.
9. **Place all answers in the boxes provided.**

Question	Marks	Out of
1		**4**
2		**9**
3		**6**
4		**6**
5		**6**
6		**6**
7		**3**
Total		**40**

1. Given that $y'' = 12x^2 - 6x + 2$, $y(0) = 1$, $y(2) = 11$, find y

2. Find the following indefinite integrals.

a. $\int \frac{1}{\sqrt[3]{(1+2x)^2}}\,dx$

b. $\int_1^e \frac{1}{x\sqrt{\ln x}}\,dx$

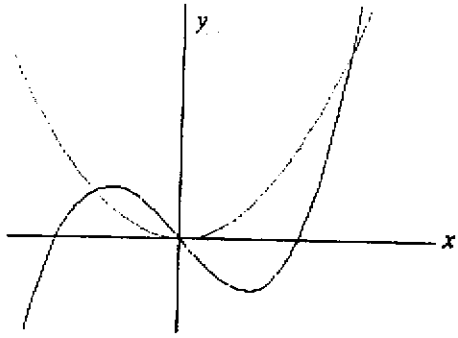
c. $\int (\ln x)^3\,dx$

3. Sketch the region in the first quadrant that is bounded by the given curve. Determine the exact area of the region by considering the limit of S_n as $n \to \infty$. Use the right- hand endpoint of each interval.

$$f(x) = 16 - x^2$$

The summation formula you will need is $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

4. Find the area bounded by the curves $y = x^2$ and $y = x^3 - 2x$. The graphs are sketched below.



5. The demand equation for a product is $p = 16q - \frac{q^2}{2}$, and the supply equation is $p = \frac{q^2}{2} - 5q - 100$, p is the price per unit when q units are demanded or supplied. Determine consumers' surplus under market equilibrium.

6. *a.* Express $\dfrac{x^2+1}{x^3+2x^2+x}$ as a sum of partial fractions.

b. Hence or otherwise evaluate $\int \dfrac{x^2+1}{x^3+2x^2+x}\,dx$.

7. Find the average value of the function $f(x) = x^3$ on the interval $[2,4]$