MATH 1242
Common Final Examination
Free Response Section
Fall 2000

This exam is divided into two parts. These pages contain Part II which consists of 6 free response questions.

Please show all of your work on the problem. We will not grade loose paper.

- If you are basing your answer on a graph on your calculator, sketch a picture of your graph on your sheet and be sure to label your window.
- **Make sure that your name appears on each page.**

At the end of the examination you MUST hand in this test booklet and all scratch paper.

PROBLEM	1	2	3	4	5	6
GRADE						

FREE RESPONSE SCORE:_____

Name: _____ Student No: _____

Instructor: _____ Section No: _____

1. Find the solution curve of the differential equation

$$y' = x^2 y^{-1}$$

which passes through the point $(-1, 1)$.

2. Let $f(x) = \sin(2x)$.

(a) Find the third-degree Taylor polynomial $T_3(x)$ of the function $\sin 2x$ at the point $a = \dfrac{\pi}{8}$.

(b) If $R_3(x) = \sin 32x - T_3(x)$, find an estimate for $|R_3(x)|$.

3. Determine if the improper integral $\displaystyle\int_{-1}^{1} \frac{1}{\sqrt[3]{x}}\, dx$ converges. If it does converge, calculate its value.

4. Find the volume of the region formed by rotating the curve

$$y = e^{-2x};\ 0 \le x \le 2$$

around the x-axis.

5. Use integration by parts to find the antiderivative of the function $f(x) = x \cos x$.