Name_____

MA 125
Final Exam
May 5, 2004

This exam contains 6 problems.
You will have 120 minutes to take the exam.
Please ask if you find any problem unclear.

Show your work and circle the final answers.

Problem	#1	#2	#3	#4	#5	#6	TOTAL
Possible	15	9	9	11	10	6	60
Points							

#**1**.

$$f(x) = \frac{1-x}{(x+1)^2}$$

(a) Find the horizontal and vertical asymptotes, if any.
(b) Find the intervals of increase or decrease.
(c) Find the local maximum and minimum values.
(d) Find the intervals of concavity and the inflection points.
(e) Find x and y intercepts.
(f) Use the information from parts (a) – (e) to sketch the graph of f.

#**2**. A curve is given by the equation

$$x \cos y + y \cos x = 1$$

(a) Find $\frac{dy}{dx}$ by implicit differentiation.

(b) Find an equation of the tangent line to the curve at the point $(1, 0)$.

#3. If 300 cm^2 of material are available to make a box with a square base and an open top, find the largest possible volume of the box.

#**4**. Find the following limits.

(a) $\lim_{x \to 0} \frac{\ln(1+x)-x}{x^2}$

(b) $\lim_{x \to \infty} \frac{\ln(\ln x)}{\ln x}$

(c) $\lim_{x \to \infty} (xe^{1/x} - x)$

#**5**. Find definite integrals.

(a) $\int_0^1 (1 + 3\sqrt{x} - e^x)\, dx =$

(b) $\int_1^3 \frac{2}{x}\, dx =$

(c) $\int_0^\pi \sin(x)\, dx =$

#**6**. Suppose $f'(x) = 2x - \sin x$.

(a) Find the most general form of $f(x)$.

(b) Find $f(x)$ if $f(0) = 2$.