NAME _____ Rec. Instr._____

Signature _____ Rec. Time_____

CALCULUS II
EXAM 3
November 17, 1998

Show all work for full credit. No calculators, books or notes are allowed. The point value of each problem is given in the margin.

problem	1	2	3	4	5	6	7	total
points								
points possible	12	12	12	12	20	21	11	100

SHOW YOUR WORK CLEARLY.

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

(12) 1. Express the following polar equations in terms of rectangular coordinates.

a. $\theta = \pi/2$

b. $r = \cos\theta$

(12) 2. Find the area inside both of the circles $r = \cos\theta$ and $r = \sin\theta$.

(12) 3. Find an equation of the parabola with focus (-2,0) and directrix $x = 2$.

(12) 4. Find an equation of the hyperbola with center (-1,3), vertices (1,1) and (1,-5), and asymptotes $3x - 2y = 7$ and $3x + 2y = 7$.

(20) 5. Determine whether the given sequence $\{a_n\}$ converges, and find its limit if it does.

(a) $a_n = 2$ for all n.

(b) $a_n = (-1)^n$

(c) $a_n = \dfrac{1}{n} \cos \dfrac{1}{n}$

(d) $a_n = \left(1 + \dfrac{1}{n}\right)^n$

(21) 6. Determine whether the given infinite series converges or diverges. If it converges, find its sum. (Pay attention to where the series starts).

(a) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n$

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{1^n + 3^n}{2^n}$

(c) $1 - \dfrac{2}{3} + \dfrac{4}{9} - \dfrac{8}{27} + \ldots$

(11) 7. Find the MacLaurin series (i.e. the Taylor series with $a = 0$) for $f(x) = e^{2x}$.