Name (Please Print) _____ Rec. Instr. _____

Your Signature _____ Class Time _____

ANALYTIC GEOMETRY AND CALCULUS II

Exam 1

September 21, 1999

§7.1-7.5, 8.1-8.5, 9.1, 9.2

Be neat, clear and complete. Show all work. No notes, books, reference material or calculators are allowed. No credit will be given for answers without supporting work. **DO NOT SIMPLIFY.**

1. Differentiate with respect to x:

(6) a) $e^x \tan^{-1} x$

(6) b) $\ln(x^2 + 2^x)$

(6) c) $x^{\ln x}$

(6) d) $\log_4(\sin^{-1} x)$

(6) e) $\sec^{-1}(x^2)$

2. Integrate:

(6) a) $\displaystyle\int xe^{(x^2+4)}dx$

(6) b) $\displaystyle\int \frac{e^x}{e^x + 5}\,dx$

(6) c) $\displaystyle\int \frac{dx}{4x^2+25}$

(6) d) $\displaystyle\int \frac{dx}{x\sqrt{9x^2-4}}$

(6) e) $\displaystyle\int \cosh x \sinh x \, dx$

(8) 3. Find the volume generated when the curve

$$y = \frac{1}{\sqrt[4]{1-x^2}}, \quad 0 \le x \le \frac{1}{2}$$

is rotated about the $x-$axis. (Give a <u>numerical</u> answer.)

(7) 4. Find the limit:

(7) a) $\displaystyle\lim_{x\to 0} \frac{x-\sin x}{x^3}$

(7) b) $\displaystyle\lim_{x\to\infty} x^{1/x}$

5. At the beginning of 1998, a databank had 1.6 million bits of data. At the end of 1998, the bank had 2.2 million bits of data. Assume that the size of the databank grows exponentially.

(6) a) Write an equation for $N(t) =$ the number of bits of data in the bank t years after Jan. 1, 1998.

(6) b) Find (in terms of exponentials and/or logarithms) the number of bits of data in the bank at the end of 2012.

(6) c) Find (in terms of exponentials and/or logarithms) the number of years after Jan. 1, 1998 it will take for the bank to have 10 million bits of data.