Math 1251 Exam 2 May 23, 1997 Your Name _____

Professor Stanton

Directions: This exam has 5 problems with the point values indicated. Do all five problems. You may use your notes, books, and calculators. If you use a table (or calculator) to find your answer, write down the word "table" (or "calculator") next to your answer. If your answer is correct, you will receive full credit for that problem, otherwise you will be awarded 0 points. This means if you copy a minus sign incorrectly you will be given 0 points.

(15) 1. Suppose that y is given implicitly as a function of x by $y^7 + e^x y = e^2 + \frac{x}{2}$. Find the equation of the best linear approximation to y near the point $(2, 1)$.

(30) 2. Find the following derivatives and limits.

(a) If $y = ln(x^2 + arctan(4x))$, then $\frac{dy}{dx} = ?$

(b) $\lim_{x \to 0} \frac{sin(xe^{-50})}{tan(2x)}$

(c) $\lim_{x \to \infty} \frac{x^{47} - ln(x)^2 - e^x}{e^{-4x} - x^{66} - e^x}$

(20) 3. Find the location of all local max-mins, and find the absolute maximum of the function $f(x) = \frac{x^4}{4} - x^2$ on the interval $[-1, 3]$.

(15) 4. Suppose that a particle moves along the hyperbola $xy = 1$. If $\frac{dx}{dt} = 3$ when the particle passes (2,1/2), what is $\frac{dy}{dt}$ at this same time?

(20) 5. True or False. (If true give a proof, if false give a counterexample. An answer alone is worth zero.)
(a) If $f'(x) = e^{-x^2}$ for all real x, then $f(x)$ has no local maxima.

(b) If $f'(0) = 0$, then there must be a negative number c and a positive number d such that $f(c) = f(d)$.