Calculus I, MAT 1214 (1)
Midterm, March 6, 1996
Instructor: D. Gokhman

Name: _____

Box your answers. Show work. Answers alone are not sufficient.

1. (40 pts.) Find the following limits:

   (a) $\displaystyle\lim_{x \to a} \frac{\frac{1}{x^2} - \frac{1}{a^2}}{x - a}$
   (b) $\displaystyle\lim_{x \to 1^-} \frac{|x - 1|}{1 - x}$
   (c) $\displaystyle\lim_{x \to 0} \frac{\sin^2 3x}{x}$
   (c) $\displaystyle\lim_{x \to 0} x^2 \cos\left(\frac{1}{x}\right)$

2. (40 pts.) Differentiate the following functions:

   (a) $(x + 1)^3 \sqrt{x - 1}$
   (b) $\dfrac{x}{x^2 + 1}$
   (c) $\sqrt[3]{1 + \sqrt{x}}$
   (d) $\sin^4 x^4$

3. (20 pts.)

   (a) Find equations for the two lines tangent to $y = x^2$ at $x_0 = -3$ and at $x_0 = 3$.

   (b) What is the point of intersection of these two tangent lines?

4. (20 pts.)

   (a) Find the critical points of the function $f(x) = 1/(x^2 + 1)$.

   (b) Find the minimum and maximum values of this function in the interval [-1,2].

1	2	3	4	total (120)