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Last Name: _____

First Name: _____

ID: _____ Section: _____

Math 150a Midterm #2. October 10, 2003

Attention! Please, note that this is the closed book test. You are not allowed to use graphing calculator. Simple calculators are allowed. Please, show all important steps in you solution but do not make your solution excessively long.

1. Find all points where the following function is discontinuous

$$f(x, y) = \begin{cases} x^3, & x < 1, \\ \sqrt{|2 - x|}, & 1 \leq x < 3, \\ -\sqrt{x - 2}, & x \geq 3. \end{cases}$$

2

2. Find the derivative $f'(x)$, if

$$f(x) = \tan(\sqrt{\cos(x^2 + 3x)}).$$

3. Find the derivative of the function using the definition of the derivative:

$$f(x) = \sqrt{x}.$$

4. For the function $f(x) = \sqrt{x} + \cos(x^2 - 1)$

- a) Find $f'(x)$;
- b) Find $df(x)$;
- c) Using differential of $f(x)$ estimate absolute error at $x = 1$ for $dx = 0.1$;
- c) Using differential of $f(x)$ estimate relative error at $x = 1$ for $dx = 0.1$;

5. Find $f^{(4)}(x)$ if

$$f(x) = \cos(2x) - \sqrt{x}.$$

6. Find $\frac{dy}{dx}$ by implicit differentiation, if

$$xy + \sqrt{x^2 + y} = \frac{1}{y - x}.$$