MATH 170 Exam 2 Name _____
March 20, 2001

This test consists of 5 pages, none of which is intentionally left blank. Take a few seconds right now to be sure you have all the pages. The point value of each question is to the left of the question number. Show all your work in the space provided. If you run out of room for an answer, continue working on the back of the page. When you finish the exam, you may hand in your paper and quietly leave.

(24) 1. First, show you know the basic formulae. Fill in the following table.

$f(x)$	$f'(x)$
x^n	
e^x	
$\ln(x)$	
$\sin(x)$	
$\cos(x)$	
$\tan(x)$	
$\cot(x)$	
$\sec(x)$	
$\csc(x)$	
$\arcsin(x)$	
$\arctan(x)$	
$\text{arcsec}(x)$	

2. Now, show you know how to apply the basic formulae. Find the derivative of each of the following functions.

(7) (a) $f(x) = 3x^3 \sin(2x) - \ln(x^2 + 1)$

(Question 2 continued. Find derivative of:)

(7) (b) $g(x) = \dfrac{xe^x}{\sqrt{x^2+1}}$

(7) (c) $h(x) = \arctan(3x+1)$

(7) (d) $f(x) = \left(x + \left(2x + (3x + (4x+5)^2)^3\right)^4\right)^5$

(7) 3. Find an equation of the tangent to the graph of

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

at the point $(1, 1/\sqrt{3})$

(8) 4. Show that any function of the form $y = A\sinh(mx) + B\cosh(mx)$ is a solution to the differential equation

$$y'' - m^2y = 0$$

(8) 5. A function f goes through the point (1,3) with a slope of 1/2. Use a linear approximation to the function to estimate $f(.99)$.

(7) 6. Use a tangent line approximation to estimate $\sqrt[3]{1.02} + \sqrt[4]{1.02}$

(8) 7. A differentiable function f goes through the point $(18, 1)$ with slope 2. If $h(x) = (f(2x^2))^3$, what is $h'(3)$?

(10) 8. A rectangle is inscribed in a circle of radius 5 inches. If the length of the rectangle is decreading at the rate of 2 inches per second, how fast is the area changing at the instant the length is 6 inches.