Name ______________________ Instructor ______________________

Technical Calculus (I)
Math 210 - Test 3
November 13, 1998

You must show all relevant work to receive full credit. The point value of each problem is shown in the left hand margin.

(10) 1. Find the equation of the tangent line and the normal line to the curve $y = \frac{1}{\sqrt{x^2+1}}$ at the point corresponding to $x = \sqrt{3}$.

(10) 2. A particle moves along the curve $y = 2\sqrt{x}$. What is the ratio of the x-component of the velocity to the y-component at $(9, 6)$?

(10) 3. Determine the values of x for which the curve defined by $y = x^2 - 2x$ is concave up, those values for which it is concave down, and any points of inflection.

(10) 4. A fence is to be constructed to enclose a rectangular area of $20,000m^2$. A previously constructed wall is to be used for one side. Sketch the length y of fence to be built as a function of the side x of the fence parallel to the wall.

(10) 5. What is the area of the largest rectangle which can be inscribed in the first quadrant under the parabola $y = 4 - x^2$?

(10) 6. Find the differential of the function $y = (4 + 3x)^{\frac{1}{3}}$.

(10) 7. Find the value of Δy and dy for the function $y = 2x^2 - 3x + 1$, corresponding to $x = 5$ and $\Delta x = 0.15$.

(20) 8. Find an antiderivative of the following functions. Check your result by differentiation.

(10) a) $f(x) = 6x + \dfrac{1}{x^4}$

(10) b) $f(x) = (4x + 3)^{\frac{1}{2}}$

(10) 9. The side of a square is increasing at the rate of $5ft/min$. How fast is the area changing when the side is $10ft$ long?