Math 165: Honors Calculus I Name:_____
Quiz 10 *Dec. 8, 1994*

1. A particle is constrained to move along a parabola whose equation is $y = x^2$.

   a) At what point on the curve are the x-coordinate and the y-coordinate changing at the same rate.

   b) Find this rate if the motion is such that at time t we have $x = \sin(t)$ and $y = \sin^2(t)$.

2. Find the extrema of the function $f(x) = 3x^4 + 4x^3 - 12x^2 + 1$ on the interval $[-3, 2]$.

3. a) State the Mean Value Theorem for Derivatives.

b) Use the Mean Value Theorem and Bolzano's Theorem to prove that the polynomial $f(x) = 2x^5 - 5x^2 + 1$ has exactly one root in the interval $[0, 1]$.