MA 125-06 **§3.2-3.8**	**Test #2**	*score*	**Name:** __________ **22 October 2000**

1. Calculate derivatives for the following functions showing the algebraic methods you use. *(8 points each)*

   (a) $f(x) = \tan(x^2)$

   (b) $f(x) = \sqrt[3]{x^2 + 3x + 1}$

   (c) $f(x) = \ln(\cos(x^2) + 2)$

   (d) $f(x) = \sqrt{1 + \sqrt{1 + x^2}}$

2. Let $f(x) = \ln x - \cos x$. Can you use the Intermediate Value Theorem to show that $f(x)$ has a root in the interval $(1, 2)$? If so, fully explain how you would do this. If not, explain why not. *(11 points)*

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3. Let C be the curve in the xy-plane described by the parametric equations $x(t) = \cos t$ and $y(t) = 2\sin t$. Find a formula, in terms of t, for the slope of the tangent line. Then determine all points on the curve that have a tangent line with slope -2. *(11 points)*

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4. A particle moves along the x-axis beginning at time $t = 0$ according to the function $x(t) = 4t^3 - 3t^2 - 18t + 3$. Where is the particle located when $t = 2$ and what is its velocity then? Determine the time intervals on which the particle is moving to the right and also those on which it is moving to the left. *(12 points)*

5. Let $h(x) = f(g(x))$. Use the information in the table to find the value of $h'(3)$. *(11 points)*

x	1	2	3	4	5
$f(x)$	5	2	3	3	1
$f'(x)$	2	1	3	2	3
$g(x)$	3	2	4	3	1
$g'(x)$	3	2	2	2	3

6. Use implicit differentiation to find a formula for $\frac{dy}{dx}$ if $xy^2 + e^x + \ln y = 1$. Then determine the slope of the tangent line to the curve when $x = 0$. *(12 points)*

7. Find the linearization of the function $f(x) = \sqrt{x}$ at $x = 4$ and use the linearization to approximate the value of $\sqrt{3.95}$. *(11 points)*