MA 125-06 §1.4,1.7,2.1-3.2	**Test #1**	*score*	**Name:** _____ **29 September 2000**

Solving by Hand

INSTRUCTIONS: Solve the problems in this section without calculator assistance. Turn in this section before proceeding to the next one (where calculators are allowed).

1. Calculate the derivative of $f(x) = 2x^2 - 4x^{\frac{3}{2}} + 6x - 2x^{\frac{1}{2}} - 1$ *(10 points)*

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2. Calculate the derivative of $f(x) = \dfrac{x^2 + 3x - 1}{x^2 + 2}$ and simplify the result. *(10 points)*

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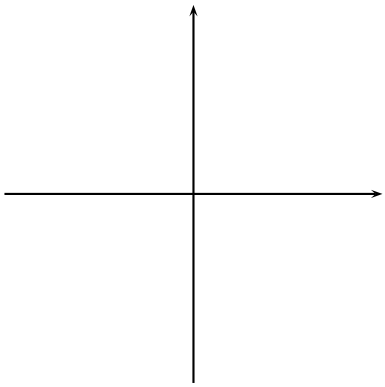
3. Calculate the derivative of $f(x) = (x^2 - 1)e^x$. Find all values of x for which the graph of $f(x)$ has a horizontal tangent line. *(10 points)*

Solving with Calculator Assistance

4. Sketch the graph of the parametric curve given by the equations

$$\begin{aligned} x(t) &= \cos(2t) + 1 \\ y(t) &= \cos(3t) \end{aligned} \tag{1}$$

Use enough of a t-interval so that you include the entire curve. Scale the axes with numerical coordinates to show the size of the graph. *(10 points)*



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5. The population P (in thousands) of the city of San Jose, California, for several years is given in the table. Estimate the rate of growth of P in 1990. What are the units (e.g., miles per hour?) in your answer. *(10 points)*

year	1986	1988	1990	1992	1994
P	716	733	782	800	817

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6. Determine where the given function is continuous. Explain fully. *(10 points)*

$$f(x) = \begin{cases} 0 & \text{for } x < 0 \\ [\![x]\!] & \text{for } 0 \le x < 2 \\ x^2 - 4x + 2 & \text{for } x \ge 2 \end{cases}$$

7. Evaluate the following limits. Give reasons where appropriate. *(10 points each)*

   (a) $\lim_{x\to\infty} \dfrac{x^2}{2x^2 + x + 1000000}$

   (b) $\lim_{x\to 1^-} \dfrac{x^2}{x - 1}$

8. Let $f(x) = \sqrt{x+1}$. Use the *definition* of derivative to calculate $f'(x)$. *(10 points)*

9. Let $r(t)$ denote the revenue of Apple Computer Company at time t. This mornings news reported the company announced that although it expected revenue to continue to increase, it will increase at a slower rate than recently. Explain what this statement means about the sign of r' and r'' now. *(10 points)*