

MA 113 - Calculus I	Spring 2002	Name: _____
FIRST MIDTERM	02/05/2002	Section: _____

Answer all of the following questions. Use the backs of the question papers for scratch paper. No books or notes may be used. You may use a calculator. You may not use a calculator which has symbolic manipulation capabilities. When answering these questions, please be sure to:

- check answers when possible,
- clearly indicate your answer and the reasoning used to arrive at that answer (*unsupported answers may receive NO credit*).

QUESTION	SCORE	TOTAL
1.		10
2.		25
3.		10
4.		7
5.		8
6.		20
7.		10
8.		10
TOTAL		100

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1. (a) (5 pts) If $f(x) = 1 - x^2$ and $g(x) = \sqrt{x}$ find a formula for $(g \circ f)(x)$.
Give the domain of $(g \circ f)(x)$.

(b) (5 pts) Which of the following functions are even, odd, neither? Explain your answer

(1) $f(x) = 3 + |x| - x^4$

(2) $g(x) = 2x^3 - x^2 + 1$

pts: /10

2. Compute the following limits. Each limit is worth 5 points.

$$(a) \lim_{x \rightarrow -1} \frac{x^2 - 3x - 4}{x + 1} = \underline{\hspace{2cm}}$$

$$(b) \lim_{h \rightarrow 0} \frac{1}{h} [(h - 4)^2 - 16] = \underline{\hspace{2cm}}$$

$$(c) \lim_{x \rightarrow 6^+} \frac{(x - 5)(3 - x)}{(x - 6)(x - 1)} = \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow 6^-} \frac{(x - 5)(3 - x)}{(x - 6)(x - 1)} = \underline{\hspace{2cm}}$$

$$(d) \lim_{x \rightarrow 2} \frac{x^4 - 16}{x - 2} = \underline{\hspace{2cm}}$$

$$(e) \text{ Find } c = \underline{\hspace{1cm}} \text{ so that } \lim_{x \rightarrow 1} \frac{x^2 + cx - x - c}{x^2 + 2x - 3} = 3.$$

pts: /25

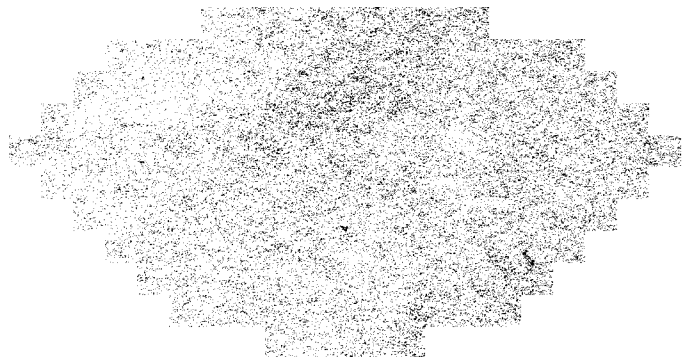
3. Find all the values of the constant c that make the function

$$h(x) = \begin{cases} c^2 - x^2 & \text{if } x < 1 \\ 2(x - c)^2 & \text{if } x \geq 1 \end{cases}$$

continuous everywhere. Graph these functions.

pts: /10

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4. Does the equation $x^3 + 3x - 2 = 0$ have a root between 0 and 1. Explain.
(Note: A calculator solution is not an acceptable answer.)



pts: /7

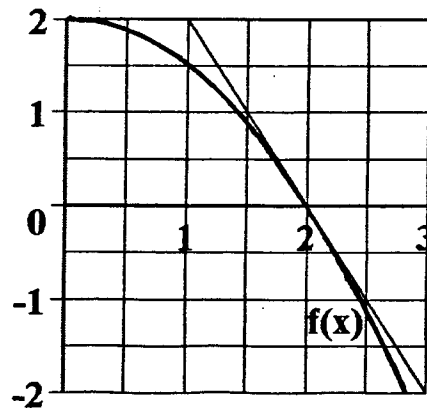
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5. A segment of the tangent line to the graph of $f(x)$ at $x = 2$ is shown in the diagram. Using information from the graph we can estimate that

$$f(2) = \underline{\hspace{2cm}} \quad f'(2) = \underline{\hspace{2cm}}.$$

Hence the equation of the tangent line to the graph of

$$g(x) = 5x + f(x)$$

at $x = 2$ is $y = \underline{\hspace{4cm}}$.



pts: /8

6. Calculate the following derivatives. Each derivative is worth 5 points.

Do not simplify your answers.

(a) If $f(x) = 3x^2 - \frac{x}{\pi} + \pi^2$ then $f'(x) =$ _____.

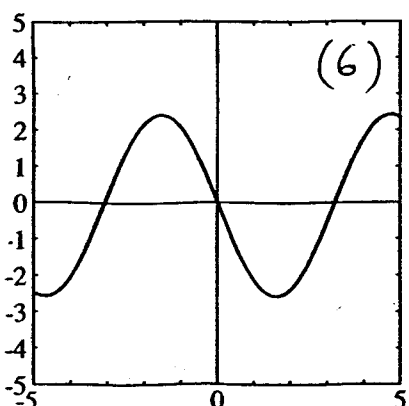
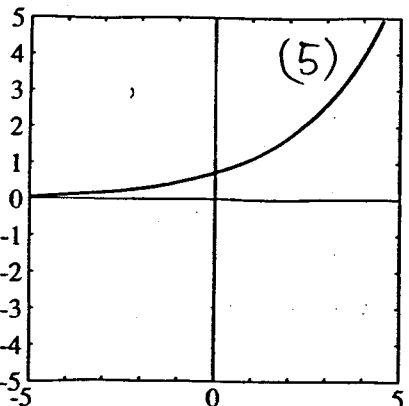
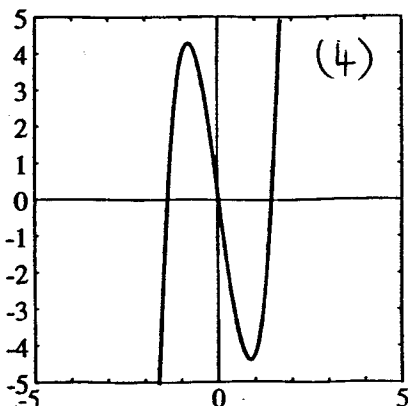
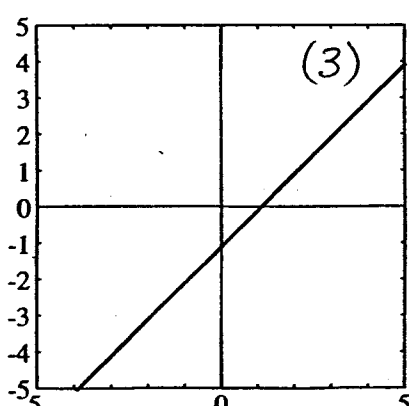
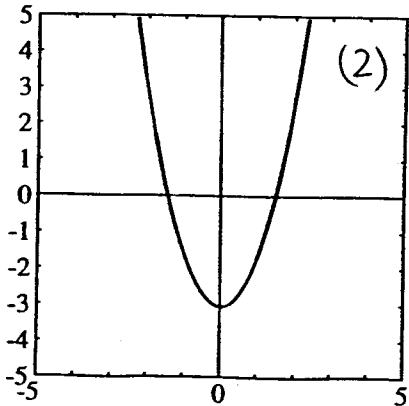
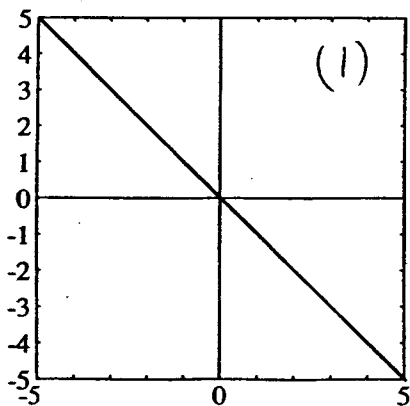
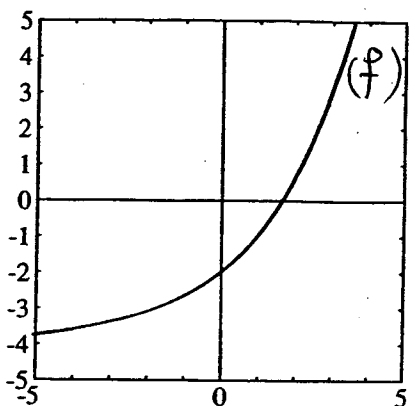
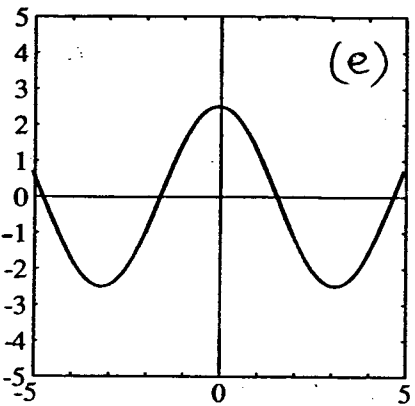
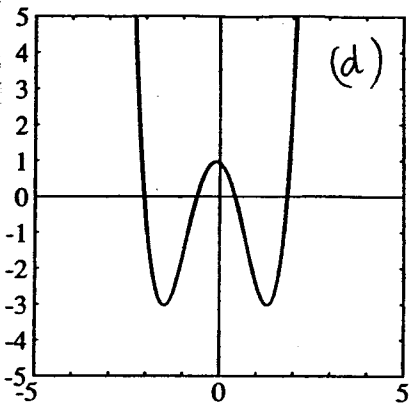
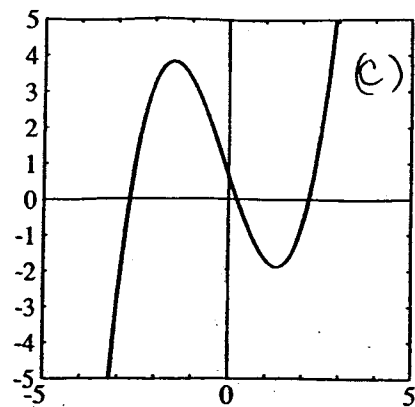
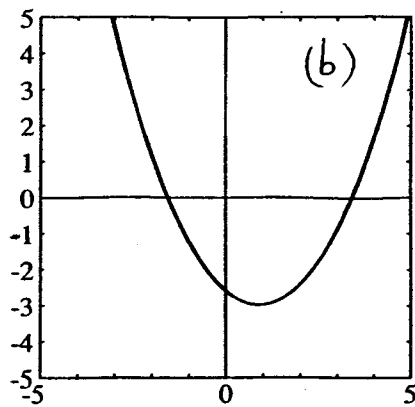
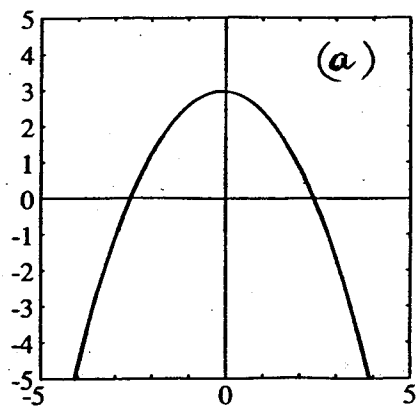
(b) If $f(x) = (x^3 - 3)(-3x - x^2)$ then $f'(x) =$ _____.

(c) If $g(t) = \frac{2t - 1}{t + 1}$ then $g'(t) =$ _____.

(d) If $p(t) = t\sqrt{t} - \frac{1}{\sqrt{t}} - 3$ then $p'(t) =$ _____.

pts: /20

7. Match the graph of each function labelled (a)-(f) with the graph of its derivative (1)-(6).



pts: /10

