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

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*) $\lim_{x\to -1} \dfrac{x^2-3x-4}{x+1} =$ _____

(*b*) $\lim_{h\to 0} \dfrac{1}{h}\left[(h-4)^2-16\right] =$ _____

(*c*) $\lim_{x\to 6^+} \dfrac{(x-5)(3-x)}{(x-6)(x-1)} =$ _____ $\lim_{x\to 6^-} \dfrac{(x-5)(3-x)}{(x-6)(x-1)} =$ _____

(*d*) $\lim_{x\to 2} \dfrac{x^4-16}{x-2} =$ _____

(*e*) Find $c =$ _____ so that $\lim_{x\to 1} \dfrac{x^2+cx-x-c}{x^2+2x-3} = 3.$

pts: /25

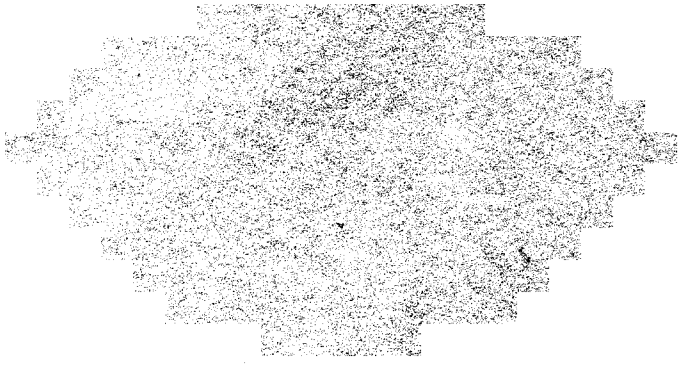
3. Find all the values of the constant c that make the function

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

continuous everywhere. Graph these functions.

pts: /10

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

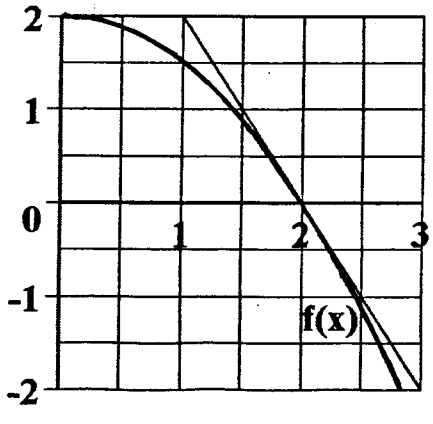
5. A segment of the tangent line to the graph of $f(x)$ at $x = 2$ is shown in the diagram. Using information from the graph we can estimate that

$f(2) =$ _____ $f'(2) =$ _____.

Hence the equation of the tangent line to the graph of

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

at $x = 2$ is $y =$ _____.



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 $f'(x) =$ _____.

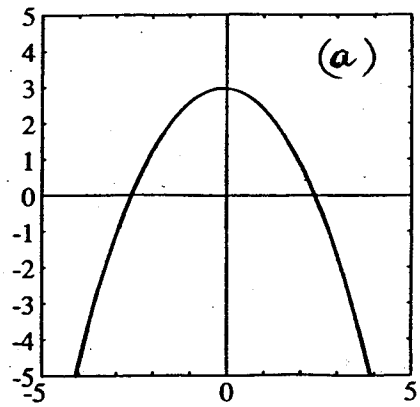
(*b*) If $f(x) = (x^3 - 3)(-3x - x^2)$ then $f'(x) =$ _____.

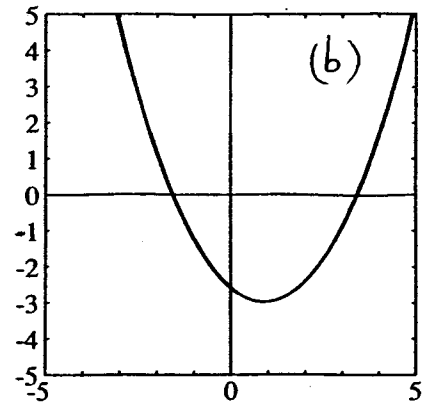
(*c*) If $g(t) = \frac{2t-1}{t+1}$ then $g'(t) =$ _____.

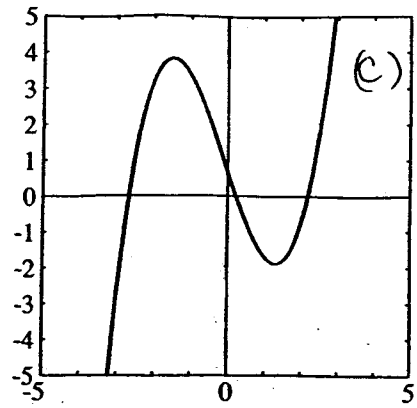
(*d*) If $p(t) = t\sqrt{t} - \frac{1}{\sqrt{t}} - 3$ then $p'(t) =$ _____.

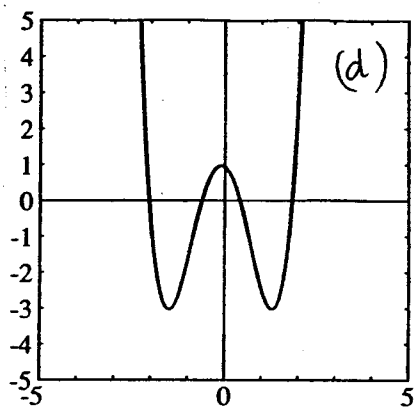
pts: /20

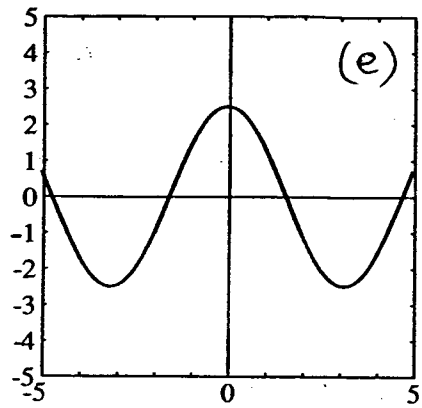
7. Match the graph of each function labelled (a)-(f) with the graph of its derivative (1)-(6).

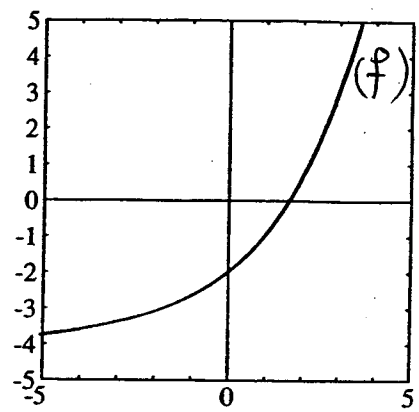


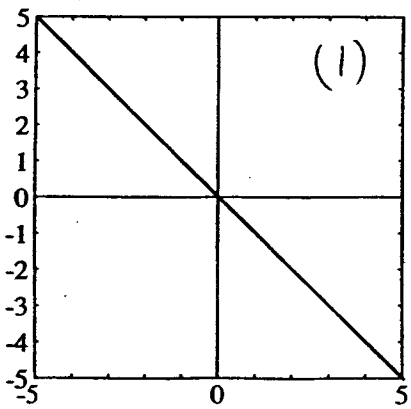


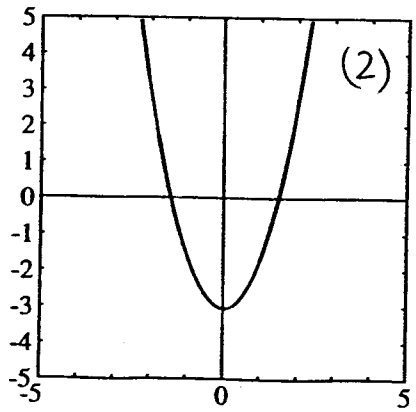


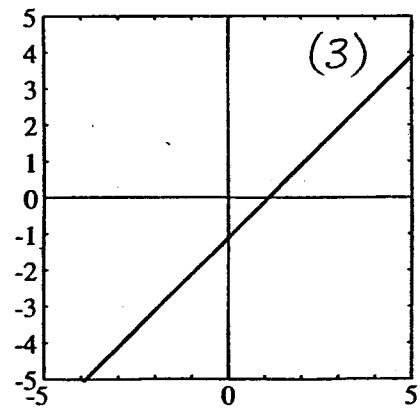


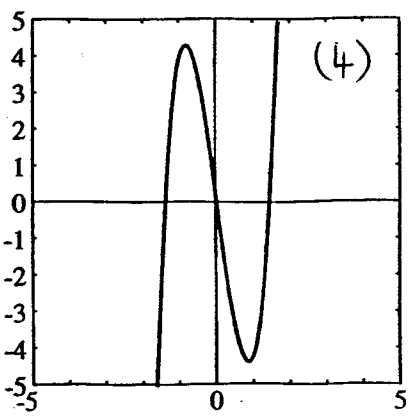


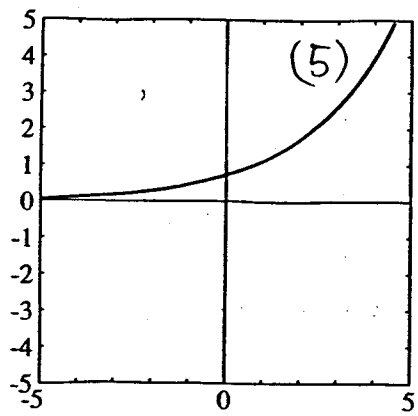


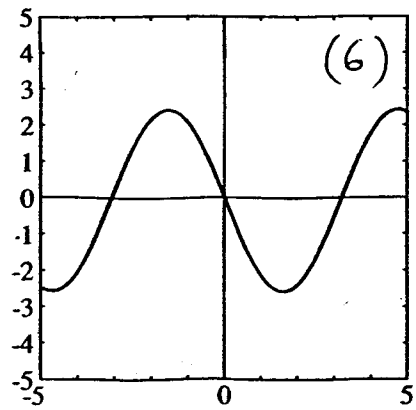












pts: /10

8. A ball is thrown upward at 64 feet per second from a height of 80 feet. In the absence of air resistance it will have height

$$h(t) = -16t^2 + 64t + 80 \text{ feet.}$$

(*a*) (3 pts) After how many seconds will the ball hit the ground?

(*b*) (2 pts) What will the velocity of the ball be 2 seconds after it is thrown?

(*c*) (2 pts) What will the velocity of the ball be when it hits the ground?

(*d*) (3 pts) How high will the ball go?

pts: /10