

NAME \_\_\_\_\_

10-digit PUID \_\_\_\_\_

RECITATION INSTRUCTOR \_\_\_\_\_

RECITATION TIME \_\_\_\_\_

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TOTAL	/100

## DIRECTIONS

1. Write your name, student ID number, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3 and 4.
2. The test has four (4) pages, including this one.
3. Write your answers in the boxes provided.
4. You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit. Please write neatly. Remember, if we cannot read your work and follow it logically, you may receive no credit.
5. Credit for each problem is given in parentheses in the left hand margin.
6. No books, notes, calculators or any electronic device may be used on this exam.

- (10) 1. Find the absolute maximum and absolute minimum values of the function

$$f(x) = \frac{x^2 - 4}{x^2 + 4} \text{ on the interval } [-2, 4].$$

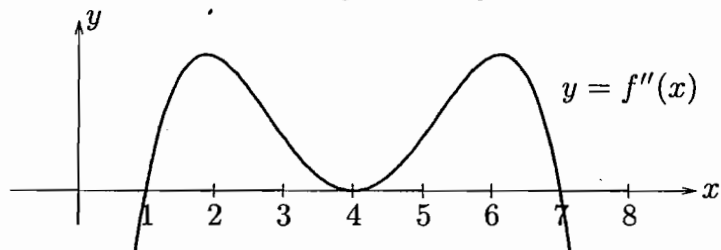
abs. max.  $f( ) =$ abs. min.  $f( ) =$ 

- (7) 2. Let  $f(x) = \frac{x - 4}{x^2 + 9}$ . Explain why there is at least one number  $c$  in  $(-1, 4)$  such that  $f'(c) = \frac{1}{10}$ . Make sure to state the name of the theorem used.

Name of theorem used:

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- (5) 3. The graph of the second derivative  $f''$  of a function  $f$  is shown. State the  $x$ -coordinates of all the inflection points of  $f$ .




- (24) 4. Find each of the following as a real number,  $+\infty$ ,  $-\infty$  or write DNE (does not exist).

(a)  $\lim_{x \rightarrow 0} \left( \frac{\sin x - x}{x^3} \right)$

(b)  $\lim_{x \rightarrow \infty} \left( 1 + \frac{1}{x} \right)^{3x}$

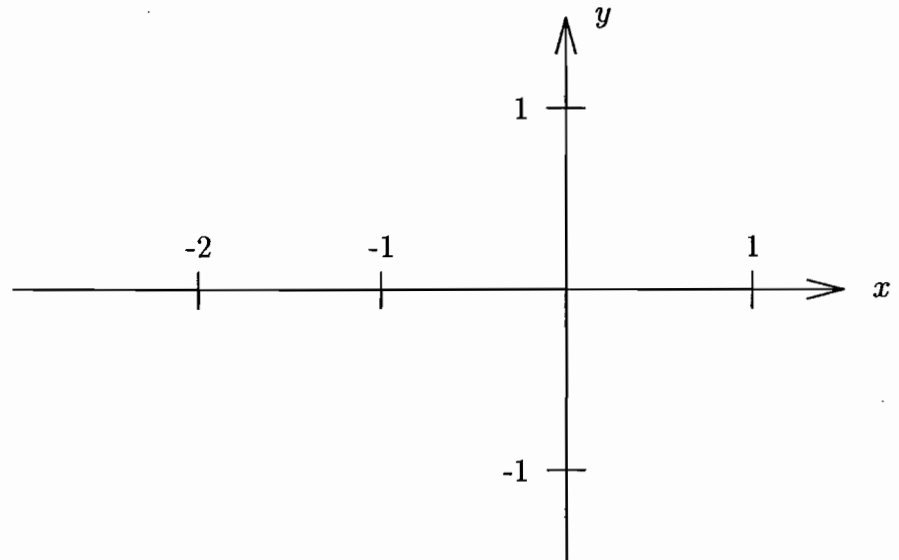
(c)  $\lim_{x \rightarrow 0^+} ((\sin x)(\ln x))$

(d)  $\lim_{x \rightarrow (\pi/2)^-} (\tan x - \sec x)$

- (10) 5. Find  $f$  if  $f'(x) = \frac{4}{\sqrt{1-x^2}}$  and  $f(\frac{1}{2}) = 1$ .

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- (18) 6. Let  $f(x) = xe^x$ . Give all the requested information and sketch the graph of the function on the axes below. Give both coordinates of the intercepts, local extrema and points of inflection, and give an equation for each asymptote. Write NONE where appropriate.



domain	
intercepts	
symmetry	
horizontal asymptotes	
vertical asymptotes	
intervals of increase	
intervals of decrease	
local maxima	
local minima	
intervals of concave down	
intervals of concave up	
points of inflection	

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- (14) 7. Use calculus to find the dimensions of the rectangle of largest area that can be inscribed in a circle of radius 2.

dimensions:

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- (6) 8. Evaluate the intergral  $\int_{-2}^2 \sqrt{4-x^2} dx$  by interpreting it in terms of an area.

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- (6) 9. Find the most general antiderivative of  $f(x) = \sin x + 5e^x$ .

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