NAME		
	Page 1	/19
STUDENT ID	Page 2	/27
RECITATION INSTRUCTOR	Page 3	/26
	Page 4	/28
RECITATION TIME	TOTAL	/100

DIRECTIONS

MA 165

- 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.
- 5. Credit for each problem is given in parentheses in the left hand margin.
- 6. No books, notes or calculators may be used on this exam.

(6)	1.	${\bf Find}$	\mathbf{the}	domain	of	the	function	g(x)	= 1	$\sqrt{x^2 - }$	6x
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(5) 2. Find $\tan \theta$ if $\sin \theta = -\frac{1}{3}$ and $-\pi < \theta < -\frac{\pi}{2}$.

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(8) 3. If $f(x) = \ln x$ and $g(x) = x^2 + 1$, find the composite functions $f \circ g$ and $g \circ f$ and their domains.

$(f\circ g)(x) =$, domain :
$(g \circ f)(x) =$, domain :

Name:

EXAM 1

- (7) 4. Solve each equation for x.
 - (a) $e^{x-1} = 2$

x =

(b) $\ln \ln x = 2$

x =

- 5. Write the equation of the graph that results by
 - (a) shifting the graph of $y = \ln x$ three units upward.

y =

(b) reflecting the graph of $y = 1 + \ln x$ about the x-axis.

y =

(c) stretching the graph of $y = \sin x$ vertically by a factor of 3.

y =

(d) reflecting the graph of $y = 3 \ln x$ about the x-axis and then about the y-axis.

y =

- (5) 6. True or False. (Circle T or F)
 - (a) The function f(x) = |x| is continuous at x = 0.

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(b) The function f(x) = |x| is differentiable at x = 0.

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(c) The function f(x) = |x| is differentiable at x = 1.

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(d) The function $g(x) = \frac{|x|}{x}$ is continuous at x = 0. (e) The function $h(x) = \ln(x-1)$ is continuous at x = 0.

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(7) 7. The function $f(x) = \begin{cases} \frac{x^2-4}{x+2} & \text{if } x \neq -2 \\ c & \text{if } x = -2 \end{cases}$ is continuous at x = -2 if c = -2

Name: _____

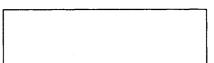
(8) 8. Prove that $\lim_{x\to 0} x^4 \sin \frac{1}{x} = 0$. Name the theorem you are using.

- (18) 9. For each of the following, fill in the boxes with a finite number or one of the symbols ∞ , $-\infty$, or DNE (does not exist). It is not necessary to give reasons for your answers.
 - (a) $\lim_{x\to\infty} \frac{x^7-1}{x^6+1} =$

	1

(b) $\lim_{t\to (-5)^{-}} \frac{1}{t+5} =$

(c) $\lim_{\theta \to 0} \frac{\sin^2 \theta}{\theta} =$



(d) $\lim_{x\to 0} \sin\frac{1}{x}$



(e) $\lim_{t\to 0} \frac{\sqrt{t+4}-2}{t} =$



(f) $\lim_{\theta \to \frac{\pi}{6}} \frac{\sin \theta}{1 + \cos \theta} =$

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(You must give the exact values of the trigonometric functions where necessary).

Name:

(10) 10. Find the derivative of $f(x) = \frac{1}{\sqrt{x}}$ using the definition of the derivative: $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}.$ (0 credit for using a formula for the derivative).

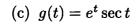
(6) 11. For what values of x does the graph of $f(x) = 2x^3 - 3x^2 - 6x + 87$ have a horizontal tangent?

x =

(12) 12. Find the derivatives of the following functions. (It is not necessary to simplify).

(a)
$$f(x) = \frac{1}{x\sqrt{x}}$$

(b) $y = \cos x - 2 \tan x$



 $(d) y = \frac{x^2 \sin x}{e^x + 1}$