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STUDENT ID	Page 2	/30
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RECITATION TIME	TOTAL	/100

DIRECTIONS

- 1. Write your name, 10-digit PUID, 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, calculators or any electronic devices may be used on this exam.
- (6) 1. Find all values of x in the interval $[0, 2\pi]$ that satisfy the equation $\sec x = 2\sin x$.

(6)	2. If $f(m) = \sqrt{m}$ and $g(m) = 1$, find the functions $f \circ g$ and $g \circ f$ and their domains	
(0)	2. If $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{x-1}$, find the functions $j \circ g$ and $g \circ j$ and then domain	o.

$$(f \circ g)(x) =$$

domain:

$$(g \circ f)(x) =$$

domain:

(6) 3. Find a formula for the inverse of $f(x) = 2x^3 + 3$.

 $f^{-1}(x) =$

(4) 4. Solve the equation $e^{2x+3} - 7 = 0$ for x.

x =

(6) 5. If $f(x) = \begin{cases} cx^2 & \text{if } x \leq 2 \\ c - x & \text{if } x > 2 \end{cases}$, find the value of the constant c for which $\lim_{x \to 2} f(x)$ exists.

c =

(6) 6. Find the equations of the vertical and horizontal asymptotes of the graph of $y = \frac{x^2 + 4}{x^2 - 1}$.

Vertical asymptotes

Horizontal asymptotes

(8) 7. Find the exact numerical value of the following:

(a)
$$e^{2 \ln 3} =$$



(b) $\log_{10} 25 + \log_{10} 4 =$



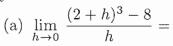
(c) $\tan(\pi e^{-\ln 4}) =$



(d) $\cos(\ln 1) =$



(15) 8. For each of the following, fill in the boxes below with a finite number, or one of the symbols $+\infty$, $-\infty$, or DNE (does not exist). It is not necessary to give reasons for your answers.





(b)
$$\lim_{t\to 0} \left(\frac{1}{t} - \frac{1}{t^2 + t}\right) =$$



(c)
$$\lim_{x \to (-4)^-} \frac{|x+4|}{x+4} =$$



(d)
$$\lim_{x \to 0} x^2 \sin \frac{\pi}{x} =$$



(e)
$$\lim_{x \to 0} \frac{x-1}{x^2(x+3)} =$$



- (4) 9. True or False. (Circle T or F)
 - (a) The function f(x) = |x 1| is continuous at x = 1.

T F

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

T F

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

T F

(d) The function $g(x) = \ln(x-1)$ is continuous at x = 0.

- T F
- (6) 10. Find an equation of the tangent line to the curve $y = \frac{2x}{x+1}$ at the point (1,1).

(11) 11. Find the derivative of the function $f(x) = \frac{1}{x^2}$ 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) 12. For what values of x is the tangent line to the curve $y = 3x^2 - 1$ parallel to the line x - 2y = -2.

x =

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

(0)	—	₊ 2	t^2 –	1
(a)	v =	ι	_	$\frac{1}{4\sqrt{t^3}}$

(b) $y = (1 - e^x) \tan x$.



(c) $f(x) = x^{\pi} + e^2$.



(d) $y = \frac{1 + \sin x}{x + \cos x}.$

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