PRINT YOUR NAME LEGIBLY AS IT APPEARS ON CLASS ROLL

LAST name:_____ FIRST name:_____

ID NUMBER: XXX–XX– __ __ __ __

CHECK THE APPROPRIATE SECTION

☐ Dr. Epperson Section 204

☐ Dr. Lin Section 101

☐ Dr. Shan Section 103

☐ Dr. Souza Section 506

☐ Dr. Vancliff Section 114

ON YOUR SCANTRON FORM, FILL IN THE TABLE:

NAME	last, first		
SUBJECT	MATH 1426-____	TEST NO.	VERS A

TURN OFF ALL CELL PHONES AND BEEPERS

DO NOT WRITE BELOW THIS LINE — DO NOT START UNTIL SO INSTRUCTED

	Points Earned
Part I (48 points)	
13 (10 points)	
14 (11 points)	
15 (11 points)	
16 (10 points)	
17 (10 points)	
PART II (52 points)	
TOTAL SCORE (100 points)	

The square brackets following an exam-question number refer to a section/problem number in the text or a lab worksheet. Problem numbers preceded by the symbol $\sim$ are modeled on that problem from the text or lab, but are not identical to it; problem numbers without the symbol are identical to, or very close to, the problem from the text or lab.

INSTRUCTIONS FOR PART I Write your answers for these questions on a scantron form (882-ES or 882-E) and mark only one answer per question.

Each of the questions in this part counts 4 points each, for a total possible score of 48 points. You may use an approved calculator. You may write on this exam or request scratch paper, if needed.

1. [W2] Find the limit: $\lim_{x\to 0} 2\sin\left(\frac{2}{3x}\right)$.

   (a) 2 (b) 1 (c) -2 (d) -1 (e) does not exist.

2. [§2.1] If f is a function that satisfies all the following properties:

   $$\lim_{x\to 3^-} f(x) = 2, \quad \lim_{x\to 3^+} f(x) = 2, \quad f(3) \text{ does not exist,}$$

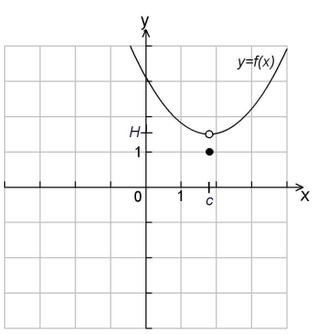
   which of the following is FALSE?

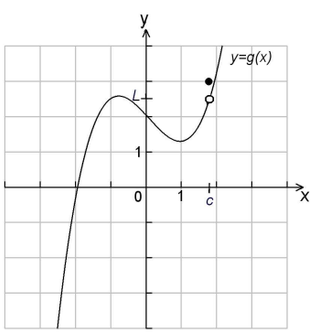
   (a) $\lim_{x\to 3} f(x) = 2$ (b) $x \to 3^-$ means that x is approaching 3 from the left
   (c) there is a hole at $x = 3$ (d) $x \to 3^+$ means that x is approaching 3 from the right
   (e) $\lim_{x\to 3} f(x)$ does not exist.

3. [§2.2] To calculate the exact value of $\lim_{x\to 4}\left(\frac{\sqrt{x}-2}{x-4}\right)$, we

   (a) only evaluate the function at $x = 4$
   (b) use the "Quotient Rule for Limits" first, then evaluate the function at $x = 4$
   (c) rationalize the numerator, simplify, then evaluate the result at $x = 4$
   (d) note that the function has the form $\frac{0}{0}$ at $x = 4$ and that the limit cannot be calculated
   (e) graph the function and use the calculator table feature to approximate the limit at $x = 4$.

4. [§2.2, W3] The graphs of functions f and g are given below. Find $\lim_{x\to c}(2f(x)+[g(x)]^2)$ if it exists.





   (a) $2L + H^2$ (b) 11 (c) $2H + 9$ (d) $2H + L^2$ (e) the limit does not exist.

5. [§2.3] Find the x-coordinates of the points of discontinuity, if any, for the following function:

$$f(x) = \begin{cases} 2x+3 & \text{if } x \le 4 \\ 7 + \dfrac{16}{x} & \text{if } x > 4. \end{cases}$$

(a) No discontinuity (b) 4 (c) 0 (d) $+\infty$ (e) 1.

6. [§2.3: 34] Find a value for the constant k if possible, that will make the following function continuous:

$$f(x) = \begin{cases} 2x+k & \text{if } x \le 2 \\ kx^2+1 & \text{if } x > 2. \end{cases}$$

(a) 5 (b) 1 (c) 0 (d) 3 (e) does not exist.

7. [§2.3] Suppose that f and g are continuous functions such that $f(2) = 1$ and $\lim_{x\to 2}(f(x) + 4g(x)) = 13$. Find $g(2)$.

(a) 2 (b) 13 (c) 4 (d) 3 (e) does not exist.

8. [§2.4, ∼#48] If $x > 0$, and if $ax + b > 0$, then the equation $\log_x(ax+b) = k$ is equivalent to

(a) $ax + b = x^k$ (b) $ax + b = k^{\log x}$ (c) $\log_x(ax) + \log_x b = k$
(d) $ax + x^b = k^x$ (e) $\log_x(ax) + \log_x(ab) = k$.

9. [§3.2] The functions f and g and their first derivatives are defined on $(-\infty, \infty)$. Their values at 0 and 1 are given in the table.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
0	2	−2	4	7
1	1	2	5	−8

If $h(x) = f(x)g(x)$, compute $h'(0)$.

(a) 6 (b) 16 (c) −2 (d) 11 (e) does not exist.

10. [§3.2] Referring to the table in Question 9, if $H(x) = \dfrac{f(x)+g(x)}{x^2}$, compute $H'(1)$.

(a) −3 (b) −1 (c) −9 (d) 3 (e) does not exist.

11. [§3.2] Referring to the table in Question 9, if $P(x) = \dfrac{f(x)g(x)}{x^2}$, compute $P'(1)$.

(a) 2 (b) −7 (c) −2 (d) 0 (e) does not exist.

12. [§3.2] Referring to the table in Question 9, find the equation of the tangent line to the graph of $y = f(x)$ at the point with x-coordinate 1.

(a) $y = 5$ (b) $5x - y + 4 = 0$ (c) $5x - y + 5 = 0$ (d) $y = 5x - 4$ (e) $x - 5y - 4 = 0$.

INSTRUCTIONS FOR PART II For these questions, you must write down **all** steps in your solutions **as if you do not have a calculator**. Write legibly, and **label any graphs or pictures**. Draw a box around your solution. Partial credit will be given for those parts of your solution that are correct. Total possible score for this part is 52 points.

13. [§2.2: 5] [10 points] Find the limit $\lim_{x\to 1}\left(\dfrac{x^2+2x-3}{x-1}\right)$ algebraically. Write out every step of your work (as usual).

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14. [§2.3: 12] [11 points] Suppose that $f(x) = \begin{cases} -x^4+3 & \text{if } x<2 \\ 3x+7 & \text{if } x=2 \\ x^2+9 & \text{if } x>2. \end{cases}$

Is f continuous on $(-\infty,\infty)$? If there are some points at which f is not continuous, is f continuous from one side? Justify your answers.

15. [11 points] Let $f(x) = \begin{cases} -5x & \text{if } x < 1 \\ \sqrt{x} - 6 & \text{if } x \geq 1. \end{cases}$

(a) Sketch the graph of f.

(b) Justify whether or not f is continuous on $(-\infty, \infty)$.

(c) Justify whether or not f is differentiable on $(-\infty, \infty)$.

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16. [§3.1 & §3.2:∼43] [10 points] Find the x-coordinate of the point on the graph of $y = x^2$ where the tangent line is parallel to the secant line that cuts the curve at $x = -1$ and $x = 2$.

17. [§3.1: 27 & §3.2:∼32] [10 points]

(a) Find the derivative of $\sqrt{5x}$ by using formulas/rules.

(b) Find the derivative of $\sqrt{5x}$ by using the definition of derivative.

Have you shown all work in Part II? Write version A on scantron form.
Indicate instructor on front of exam.