Math 135: Calculus I, Exam #1

Name: _____

ID# (last 4 digits): _____ Section: _____

- Problems #1 – #8 are marked as "no partial credit". For these problems, you are not required to show work, and any scratch work will not be considered. You will be awarded none or all of the points, depending only on whether your answer is exactly correct.
- Problems #9 – #14 are marked as "partial credit" For these problems, you are required to show work, and you will be awarded points based on your work. Your work must be written clearly using proper notation. Answers must be justified using techniques that have been taught in this course, and answers without such justification may receive less than full credit – or no credit at all – even if the answer is correct.
- This exam is closed book. Calculators, electronic devices, notes, books, formula sheets, and other outside materials are not allowed. Phones must be turned off and put away.
- Unless otherwise stated, give exact answers: e.g., write π and $\sqrt{2}$ instead of 3.14 and 1.41. However, when an expression simplifies to a well-known value, you must use that value. For example, you must write 1 instead of e^0, and you must write $\frac{1}{2}$ instead of $\cos(\frac{\pi}{3})$.

Problem	Points	Score
1.	5	
2.	5	
3.	5	
4.	5	
5.	5	
6.	5	
7.	5	
8.	5	
9.	10	
10.	10	
11.	10	
12.	10	
13.	10	
14.	10	
Total:	100	

For problems #1 – #8, write your final answer in the appropriate box below.

Problem	Final Answer
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

For problems #1 – #8, you are not required to show work, and any work you do write will not be graded. Write your final answer in the table on Page #2 of the exam booklet.

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1. Find all solutions to the following equation. If there is no solution, write "No Solution":

$$\ln\left(\frac{2x^2}{3-x}\right) - \ln(x) = \ln\left(\frac{4x}{4-x}\right)$$

2. Solve the inequality $x^2 + 4x - 32 < 0$. Write your answer using interval notation.

3. Evaluate the limit or determine that it does not exist. If the limit does not exist, write "DNE".
$\lim_{x\to 6}\left(\frac{36-x^2}{x-6}\right)$.

4. Evaluate the limit or determine that it does not exist. If the limit does not exist, write "DNE".
$\lim_{x\to 0}\left(\dfrac{2x^2}{\sin^2(5x)}\right)$.

5. Find the value of k that makes f continuous at $x = 1$ or determine that no such value of k exists. If there is no k value exists, write "DNE".

$$f(x) = \begin{cases} kx^3 + e^{x-1} & , \quad x < 1 \\ 3x - \ln(2x-1) & , \quad x \geq 1 \end{cases}$$

6. Calculate $g'(x)$. After calculating the derivative, do not simplify your answer.

$$g(x) = \ln(4x - \tan x)$$

7. Calculate $g'(x)$. After calculating the derivative, do not simplify your answer.

$$g(x) = (x - \sqrt{2x+3})^{1/3}$$

8. Find the coordinates of the points on the graph of $y = 2x^3 - 24x$ where the tangent line is horizontal. Your answer should be a list of ordered pairs.

For problems #9 – #14, you must show all work, and your work will be graded. Your explanation should be clear and coherent. You must use proper calculus methods and notation to receive full credit.

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9. Evaluate the limit or determine that it does not exist. If the limit does not exist, write "DNE". You must use proper calculus methods and notation to receive full credit.

$$\lim_{x\to 1} f(x) \text{ , where } f(x) = \begin{cases} \dfrac{\sqrt{x}-1}{x-1} & , \quad x > 1 \\ 8 & , \quad x = 1 \\ \dfrac{2x-2}{x^2+2x-3} & , \quad x < 1 \end{cases}$$

10. Find the values of a and b that make f continuous for all x or determine that no such values of a and b exist. You must use proper calculus methods and notation to receive full credit.

$$f(x) = \begin{cases} e^x - 2 & , \quad x \leq 0 \\ \dfrac{b(x^2-1)}{1-x} & , \quad 0 < x < 1 \\ x^2 - a & , \quad x \geq 1 \end{cases}$$

11. You must use the limit definition of derivative and proper notation to receive full credit. If you simply quote a derivative rule without using the limit definition, you will receive no credit.

$$\text{Let } f(x) = \frac{x-2}{x+1}. \quad \text{Calculate } \quad f'(-2).$$

12. Calculate $f'(x)$. After calculating the derivative, do not simplify your answer.

(a) $f(x) = \sqrt{x}(\sqrt{x} - x^{3/2}) + \pi^{1/3}$

(b) $f(x) = \dfrac{\sin(2x-4)}{x^2-4}$

13. Find the x-coordinate of each point on the graph of $y = \dfrac{4+2x}{1-3x}$ where the tangent line is perpendicular to the line $y = \dfrac{-1}{14}x - 4$.

14. For both parts of this problem let $f(x) = x^2 - 4x + 1$.

(a) (2 points) Calculate $f'(3)$ by using derivative rules to receive full credit.

(b) (8 points) Calculate $f'(3)$ by using the limit definition of derivative and proper notation to receive full credit. If you simply quote a derivative rule without using the limit definition, you will receive no credit.