

NAME (*please print*): _____

HONOR CODE PLEDGE: _____

SIGNATURE: _____

Please write your answers clearly to all problems, showing all work. You are not allowed to use any notes or review sheets or calculators during the exam. You have exactly 50 minutes to complete the exam. Good Luck!

Problem Number	Possible Points	Points Earned:
1	20	
2	20	
3	30	
4	24	
5	15	
Total:	109	

- (20) 1. Please use the definition of instantaneous velocity to find the equation of the tangent line to the curve $y = \frac{1}{x+2}$ at $x = 0$, showing all work.

- (20) 2. Please evaluate each of the following limits, giving either a value or explaining why (and to what extent) the limit does not exist. Partial credit will be given for incorrect answers if correct scratchwork is shown.

(a) $\lim_{x \rightarrow -\infty} \frac{-2x^3 - 5x + 4}{100x^2 - 16}$

(b) $\lim_{x \rightarrow \pi} x^3 + [x] + \sin(x)$

(c) $\lim_{x \rightarrow 0} \frac{x}{|x|}$

(d) $\lim_{x \rightarrow 0} \frac{\tan(7x^2)}{\sin(13x)}$

- (30) 3. Please find the following limits and carefully justify your answer by using our known theorems and limits.

(a) $\lim_{x \rightarrow 1^-} \frac{x^4 - 1}{x^2 + 6x - 7}$

(b) $\lim_{x \rightarrow 2} \frac{\sqrt{x-1} - 1}{2-x}$

(c) $\lim_{x \rightarrow 0} \frac{\cot(3x)}{\csc(5x)}$

- (24) 4. Please decide which of the following functions are continuous at $x = 0$, and carefully justify your reasoning.

(a) $f(x) = \frac{\sin(3x)}{9x^3 + 17x^2 + 11x}$

(b) $f(x) = \cot(x^5 + 7)$

(c) $f(x) = \text{Arctan}(e^x) + \lfloor x - \frac{1}{2} \rfloor$

- (15) 5. Please carefully state the squeeze theorem and use it to evaluate

$$\lim_{x \rightarrow 0} x^2 \sin\left(\frac{5}{x} + 11x\right).$$