

Name: \_\_\_\_\_ PID: \_\_\_\_\_

TA: \_\_\_\_\_ Sec. No: \_\_\_\_\_ Sec. Time: \_\_\_\_\_

**Math 20A.**  
**Midterm Exam 1**  
**October 21, 2010**

*Turn off and put away your cell phone.*

*No calculators or any other electronic devices are allowed during this exam.*

*You may use one page of notes, but no books or other assistance during this exam.*

*Read each question carefully, and answer each question completely.*

*Show all of your work; no credit will be given for unsupported answers.*

*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

*If any question is not clear, ask for clarification.*

#	Points	Score
1	6	
2	6	
3	6	
4	6	
5	4	
$\Sigma$	28	

1. (6 points) Evaluate each of the following limits, or state that it does not exist.

(a)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 + 3x - 10}$ .

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

(c)  $\lim_{x \rightarrow 0} f(x)$  where  $f(x) = \begin{cases} \frac{2|x|}{x} & \text{if } x \neq 0, \\ 0 & \text{if } x = 0. \end{cases}$

2. (6 points) Show that the equation  $e^x = \frac{1}{4}x^2 + 2$  has at least one solution in the interval  $[0, 1]$ . (Note:  $e \simeq 2.7$ )

3. (6 points) Let  $f(x) = \sqrt{2x+1}$ . Compute  $f'(x)$  using the limit definition of the derivative.

4. (6 points) Let  $g(x) = \sqrt{5-x} + 3$ .

(a) Determine the domain and range of  $g$ .

(b) Find a formula for the inverse  $g^{-1}(x)$  and state its domain and range.

5. (4 points) Let  $f$  be a function such that  $f(2) = 2$  and  $f'(2) = -5$ .

(a) Find an equation for the line tangent to the graph of  $f$  at the point  $(2, 2)$ .

(b) Find the value of  $\lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2}$  and justify your answer.