

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

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

**Math 20A.**  
**Midterm Exam 1**  
**October 23, 2008**

*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	9	
4	6	
5	6	
6	6	
$\Sigma$	39	

1. Let  $f(x) = 2 + \sqrt{2 - x}$ .

(a) (2 points) Determine the domain and range of  $f$ .

(b) (4 points) Find a formula for the inverse  $f^{-1}(x)$  and state its domain and range.

2. Let  $f(t) = \frac{18}{1 + e^t}$ .

(a) (3 points) Find  $f'(t)$ .

(b) (3 points) Compute  $f'(\ln(2))$ . The correct value is an integer.

3. Find the following limits:

(a) (3 points)  $\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$

(b) (3 points)  $\lim_{\theta \rightarrow 0} \frac{2\theta^2}{\sin(2\theta) \sin(5\theta)}$

(c) (3 points)  $\lim_{x \rightarrow \pi^+} \frac{5 \cos(x)}{x - \pi}$

4. (6 points) Use the intermediate value theorem to show that there is at least one negative real number  $x$  satisfying the equation  $x^3 - x + 1 = 0$ .

5. Let  $g$  be a function such that  $g(1) = 2$  and  $g'(1) = -5$ .

(a) (3 points) Find an equation for the line tangent to the graph of  $g$  at the point  $(1, 2)$ .

(b) (3 points) Find the value of  $\lim_{x \rightarrow 1} \frac{g(x) - g(1)}{x - 1}$  and justify your answer.

6. (6 points) Find the rate of change of the volume  $V$  of a cube with respect to its surface area  $A$ .