

**MATH 2200 Exam 1**

**Instructor: Dr. Shuzhou Wang**

**Print Your Name:**

**UGA Student Honor Code:** “I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others.”

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Without your signature, your paper will not be graded.

UGA Academic Honesty Policy applies. **No Calculators.** Closed Book. *Show work, otherwise no credit will be given.* You lose points for giving confusing arguments. Cross out the parts you do not want to be graded. The last problem is optional. The rest problems are worth 100 points (i.e. 100%).

Problem #	Points	Score
1	40	
2	20	
3	25	
4	15	
bonus	15	
Total	115	

1. (40 points) Evaluate the following limits

(a) 
$$\lim_{x \rightarrow 2} \frac{x^2 + 2x - 8}{x^2 + 4x - 12}$$

(b) 
$$\lim_{x \rightarrow 3} \frac{\sqrt{x+6} - 3}{x-3}$$

$$(c) \quad \lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$$

$$(d) \quad \lim_{x \rightarrow 0^+} \frac{\sin x}{\sqrt{x}}$$

$$(e) \quad \lim_{x \rightarrow 0^-} \frac{2x - |x|}{3x}$$

2. (20 points) A projectile is fired at a certain angle. Assume its trajectory is the part of the parabola  $y = x - \frac{1}{600}x^2$  for which  $y \geq 0$  (unit of length is foot and  $x$  denotes the horizontal distance). (a) How far does the projectile travel before it hits the ground? (b) Use the method of tangent line to find the maximum height above the ground that the projectile attains.

3. (25 points) (a) Use the slope of tangent formula (also called slope predictor in the textbook) to find the slope of tangent of the curve  $f(x) = 4x + \frac{1}{x}$  at  $x$ , where  $x$  is any number different from 0; (b) Find all points  $(a, f(a))$  where the tangent line is horizontal.

4. (15 points) Does  $\lim_{x \rightarrow 3} \frac{x^2 - 9}{|x - 3|}$  exist? Explain your answer.

5. \* **Optional** (15 bonus points) (Note: This is not as easy as the other problems)  
Find the equations of the two lines through  $(4, -20)$  that are tangent to  $y = x^2$ .