

Math 1551  
Summer 2018  
Midterm 1  
6/1/18

Name (Print): \_\_\_\_\_

Time Limit: 75 Minutes

Section \_\_\_\_\_

This exam contains 8 pages (including this cover page) and 7 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- If you use a “fundamental theorem” you must indicate this and explain why the theorem may be applied.
- Organize your work, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- Mysterious or unsupported answers will not receive full credit. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, use the back of the pages; clearly indicate when you have done this.
- Use pen to write your answers. If you use a pencil then, you will lose your right to regrade your exam.

Problem	Points	Score
1	10	
2	20	
3	10	
4	20	
5	10	
6	10	
7	10	
Total:	90	

Do not write in the table to the right.

1. (10 points) (a) (5 points) Find

$$\lim_{x \rightarrow -4^-} (x + 6) \frac{|x + 4|}{x + 4}.$$

(b) (5 points) Find

$$\lim_{x \rightarrow 0^+} \frac{x \csc 10x}{\cos 5x}.$$

2. (20 points) Find  $f^{-1}(x)$  for the following functions and find **the domain** of  $f^{-1}(x)$ .

(a) (10 points)

$$f(x) = \ln(25 - x)$$

(b) (10 points)

$$f(x) = \frac{x - 1}{x + 1}$$

3. (10 points) Find the slope of the tangent line of  $y = x^2 - 3x - 4$  at  $x = 2$  by finding the limit of the secant slopes.(i.e., use the interval  $[2, 2 + h]$  and take the limit  $h \rightarrow 0$ )

4. (20 points) (a) (5 points) Find

$$\lim_{h \rightarrow 0} \frac{\sqrt{15h + 1} - 1}{h}.$$

(Do not use the definition of derivative)

(b) (5 points) Find

$$\lim_{x \rightarrow \infty} \frac{x^2 - 3x + 1}{2x^2 + 4x + 1}.$$

(c) (5 points) If  $\sqrt{7 - 6x^2} \leq f(x) \leq \sqrt{7 + 7x^2}$ , find  $\lim_{x \rightarrow 0} f(x)$ .

(d) (5 points) Find

$$\lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x - 3}.$$

5. (10 points) Let  $f(x) = \sqrt{16 - x^2} + 1$ .

(a) (3 points) Find the domain of  $f(x)$ .

(b) (5 points) Sketch the graph of  $f(x)$ .

(c) (2 points) Find the range of  $f(x)$  using a graph in (b).

6. (10 points) Let  $f(x) = \sqrt{x+2}$ ,  $g(x) = \frac{1}{x+2}$  and  $h(x) = \frac{1}{x-1}$ .
- (a) (5 points) Write a formula for  $f \circ g \circ h$ .

- (b) (5 points) Find a domain for  $f \circ g \circ h$ .

7. (10 points) Find the average rate of change of the function over the given interval.

$$f(t) = \sqrt{2t + 2}; \quad [1, 7]$$