

Name:

Math 1441 Practice Midterm 1

You have 75 minutes to finish the exam. This exam contains 6 pages (including this cover page) and 5 problems. Check to see if any pages are missing. Print your name 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:

- **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.

Do not write in the table to the right.

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total:	50	

1. Let

$$f(x) = \begin{cases} 0 & \text{if } x \leq 0 \\ x^2 & \text{if } 0 < x < 1 \\ 2 & \text{if } x = 1 \\ 1 & \text{if } x > 1. \end{cases}$$

(a) (2 points) Sketch the graph of f .

(b) (3 points) Determine the values of c at which $\lim_{x \rightarrow c} f(x)$ exists.

(c) (3 points) Determine the values of c at which f is continuous.

(d) (2 points) Find the horizontal asymptote(s).

2. Find the limit, if it exists.

(a) (3 points)

$$\lim_{x \rightarrow -2} \frac{x^2 + 1}{x + 1}$$

(b) (3 points)

$$\lim_{x \rightarrow 3} (2x + 1)(x - 1)^2$$

(c) (4 points)

$$\lim_{x \rightarrow 1} \frac{x}{\sqrt{4 - x^2}}$$

3. Evaluate the limit.

(a) (5 points)

$$\lim_{x \rightarrow 10} \frac{9x^2 - 900}{x^2 - 11x + 10}$$

(b) (5 points)

$$\lim_{x \rightarrow -\infty} \frac{6x^4 + 3x^2 + 2x}{2x^4 + 2x^3 - x}$$

4. Find the limit, if it exists. Otherwise explain why the limit does not exist.

(a) (3 points)

$$\lim_{x \rightarrow 2^-} \frac{x - 3}{x - 2}$$

(b) (3 points)

$$\lim_{x \rightarrow 0} \frac{1}{x^3}$$

(c) (4 points)

$$\lim_{x \rightarrow 3} \frac{1}{(x - 3)^2}$$

5. (10 points) Find the horizontal and vertical asymptotes. Justify your answers.

$$y = \frac{x - 1}{x^2 - 1}$$