



*University of Connecticut  
Department of Mathematics*

---

MATH 1131Q

EXAM 1 PRACTICE

SPRING 2017

NAME: \_\_\_\_\_

DISCUSSION SECTION: \_\_\_\_\_

**Read This First!**

- Read the questions and instructions carefully.
- The available points for each problem are given in brackets.
- You must **show your work** to obtain full credit (and to possibly receive partial credit). Correct answers with no justification will not receive credit.
- Make sure your answers are clearly indicated, and cross out any work you do not want graded.
- Do not leave any blanks! Even if you do not arrive at an answer, show as much progress towards a solution as you can, and explain your reasoning.
- Calculators are allowed, but models that can do symbolic computations (TI-89 and above, including TI-NSpire) are not allowed.

**Grading - For Administrative Use Only**

Page:	1	2	3	4	Total
Points:	12	16	12	10	50
Score:					

1. Evaluate each of the following limits **using algebraic methods (no credit will be given for any other method)**.

(a)  $\lim_{x \rightarrow -5} \frac{\sqrt{x+14} - 3}{x+5}$

[6]

(b)  $\lim_{x \rightarrow \infty} \frac{2x + 1 - 3x^2}{\sqrt{7x^4 - x^2}}$

[6]

2. Let  $f(x)$  be a function that satisfies all of the following:

- $\lim_{x \rightarrow 1^-} f(x) = 3$ ,  $\lim_{x \rightarrow 1^+} f(x) = 0$ , and  $f(1) = 2$ .
- $\lim_{x \rightarrow 4^-} f(x) = 1$ ,  $\lim_{x \rightarrow 4^+} f(x) = 1$ , and  $f(x)$  is discontinuous at  $x = 4$ .

(a) Sketch a possible graph for  $f(x)$ . **Mark and label appropriate  $x$  and/or  $y$  coordinates on the axes for full credit.** [6]

(b) Find  $\lim_{x \rightarrow 1} f(x)$ , or say it does not exist. Briefly justify your answer. [2]

(c) Is  $f(x)$  continuous from the left or right or neither at  $x = 1$ ? Briefly justify your answer. [2]

3. Find all vertical asymptotes, or show that none exist, for  $f(x) = \frac{x^2 - 6x - 7}{x^2 - 9x + 14}$ . [6]

4. Let  $f(x) = \frac{8}{x^2}$ .

(a) Find  $f'(x)$  using the limit definition of the derivative (no credit will be given for any other method). [6]

(b) Use your answer from part (a) to find  $f'(2)$ . [2]

(c) Use your answer from part (b) to find the equation of the tangent line to  $y = \frac{8}{x^2}$  at  $x = 2$ . [4]

5. Circle to indicate whether each statement is true or false, and **justify your answers**.

(a) If  $\lim_{x \rightarrow 1} g(x) = 0$  and  $\lim_{x \rightarrow 1} h(x) = 0$ , then  $\lim_{x \rightarrow 1} \frac{g(x)}{h(x)}$  does not exist.

[3]

**True**    **False**

(b) Let  $f(x)$  be a function. If  $f'(2)$  exists, then  $\lim_{x \rightarrow 2} f(x) = f(2)$ .

[3]

**True**    **False**

6. The graph of a function  $f(x)$  is shown below. Use the graph to estimate the greatest value of  $\delta$  so that if  $0 < |x - 1| < \delta$ , then  $|f(x) - 2| < 0.5$ . **Mark the graph to show how you calculate any values you use. Justify your answer.**

[4]

