



University of Connecticut
Department of Mathematics

MATH 1131

PRACTICE EXAM 1

FALL 2017

NAME: _____

SIGNATURE: _____

Instructor Name: _____ Lecture Section: _____

TA Name: _____ Discussion Section: _____

Read This First!

- Please read each question carefully. All questions are multiple choice. There is only one correct choice for each answer. Each question is one point.
- You must indicate the answer for each question in **TWO** places:
 - (1) circle the letter of the correct answer for each question,
 - (2) fill in answers on the separate answer sheet.

Hand in both the exam and the answer sheet.
- Calculators are allowed **below the level of TI-89**. In particular, **TI-Nspire is not allowed**. No books or other references are permitted.

1. The distance traveled by a particle in t seconds is given by $s(t) = t^2 + 3t$. What is the particle's average velocity over the interval $1 \leq t \leq 4$? [1]

(A) 8 (B) 0 (C) 2

(D) 5 (E) -1

2. Evaluate the following limit: [1]

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

(A) 2 (B) -2 (C) -1

(D) $+\infty$ (E) $-\infty$

3. If $\lim_{x \rightarrow 3^+} f(x) = 5$ what can be said about $\lim_{x \rightarrow 3^-} f(x)$? [1]

(A) It must be 5 (B) It must be $f(3)$ (C) It must be $f(5)$

(D) It must be -5 (E) It cannot be determined

4. If $-x^2 - x + 1 \leq g(x) \leq x^2 - x + 1$ for all $x \neq 0$, what is $\lim_{x \rightarrow 0} g(x)$? [1]

(A) 0 (B) 1 (C) 2

(D) $g(0)$ (E) Cannot be determined

5. Evaluate the following limit: [1]

$$\lim_{x \rightarrow 4} \frac{x^2 - 8x + 16}{x - 4}.$$

(A) 0 (B) 8 (C) -8

(D) $+\infty$ (E) $-\infty$

6. If $\lim_{x \rightarrow 1} f(x) = 3$, $\lim_{x \rightarrow 1} g(x) = -2$, and $\lim_{x \rightarrow 1} h(x) = 4$, evaluate the limit

[1]

$$\lim_{x \rightarrow 1} \left(\frac{2f(x)}{g(x)} + \sqrt{h(x)} \right).$$

(A) -1 (B) 3 (C) 13

(D) 5 (E) 7

7. When showing $\lim_{x \rightarrow 2} (5x + 1) = 11$ by the $\varepsilon - \delta$ definition of limits, which of the following is an *acceptable* value for δ when $\varepsilon = 0.01$?

[1]

(A) 0.05 (B) 0.5 (C) 0.1

(D) 0.02 (E) 0.001

8. Determine the value of the number k that makes the function $f(x)$ below continuous:

[1]

$$f(x) = \begin{cases} 1 - kx & \text{if } x < 1, \\ k + x & \text{if } x \geq 1. \end{cases}$$

(A) 0 (B) 1 (C) $-3/4$

(D) $1/2$ (E) $15/17$

9. Consider the function

[1]

$$h(x) = \begin{cases} \frac{1}{x} & \text{if } 0 < x < 1, \\ x & \text{if } x > 1. \end{cases}$$

Which of the following are true?

I. $\lim_{x \rightarrow 1^+} h(x)$ exists

II. $\lim_{x \rightarrow 1^-} h(x)$ exists

III. $\lim_{x \rightarrow 1} h(x)$ exists

IV. $h(x)$ is continuous at $x = 1$

(A) I only (B) I and II only (C) I, II, and III only

(D) IV only (E) I, II, III, and IV

10. If the function $f(x)$ is continuous on the interval $[-1, 3]$, $f(-1) = 1$, and $f(3) = 11$, which numbers below are guaranteed to be values of $f(x)$ by the Intermediate Value Theorem on the interval $(-1, 3)$?

[1]

I. 3

II. $\sqrt{2}$

III. 3π

(A) I only (B) II only (C) III only

(D) I and II only (E) I, II, and III

11. The function $f(x) = \frac{x^2 + 1}{x^3 + 8}$ has which of the following?

[1]

- (A) no vertical or horizontal asymptotes
- (B) 1 vertical asymptote and 1 horizontal asymptote
- (C) 2 vertical asymptotes and 1 horizontal asymptote
- (D) 1 vertical asymptote and 2 horizontal asymptotes
- (E) 1 vertical asymptote and no horizontal asymptotes

12. Evaluate the following limit:

[1]

$$\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 2}}{x}.$$

- (A) $+\infty$ (B) $-\infty$ (C) 0
- (D) 1 (E) -1

13. If $f(x) = 3x^{10}$, then $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$ is which of the following?

- (A) $30x^9$ (B) $\frac{3}{11}x^{11}$ (C) 3
- (D) 30 (E) $\frac{3}{11}$

14. For what value of the number k is the following function differentiable at $x = 0$?

[1]

$$f(x) = \begin{cases} -x & x \leq 0 \\ k & x > 0 \end{cases}$$

- (A) -2 (B) -1 (C) 0
(D) 1 (E) No value of k makes this function differentiable at $x = 0$

15. If $f(x) = \sqrt{x} + \frac{1}{\sqrt{x}}$ for $x > 0$, then $f'(4)$ is which of the following?

[1]

- (A) $\frac{5}{4}$ (D) $\frac{3}{4}$ (C) $\frac{3}{16}$
(B) $\frac{255}{32}$ (E) $\frac{257}{32}$