

MA 16100
EXAM 1 Form 01
February 5, 2019

NAME _____ YOUR TA'S NAME _____

STUDENT ID # _____ RECITATION TIME _____

Be sure the paper you are looking at right now is GREEN! Write the following in the TEST/QUIZ NUMBER boxes (and blacken in the appropriate spaces below the boxes):

01

You must use a #2 pencil on the mark-sense sheet (answer sheet). On the mark-sense sheet, fill in your TA's name and the COURSE number. Fill in your NAME and STUDENT IDENTIFICATION NUMBER and blacken in the appropriate spaces. Fill in your four-digit SECTION NUMBER. If you do not know your section number, ask your TA. Sign the mark-sense sheet.

There are 12 questions, each worth 8 points (you will automatically earn 4 point for taking the exam). Blacken in your choice of the correct answer in the spaces provided for questions 1–12. Do all your work in this exam booklet. Use the back of the test pages for scrap paper. Turn in both the scantron and the exam booklet when you are finished.

If you finish the exam before 8:50, you may leave the room after turning in the scantron sheet and the exam booklet. You may not leave the room before 8:20. If you don't finish before 8:50, you MUST REMAIN SEATED until your TA comes and collects your scantron sheet and your exam booklet.

EXAM POLICIES

1. Students may not open the exam until instructed to do so.
2. Students must obey the orders and requests by all proctors, TAs, and lecturers.
3. No student may leave in the first 20 min or in the last 10 min of the exam.
4. Books, notes, calculators, or any electronic devices are not allowed on the exam, and they should not even be in sight in the exam room. Students may not look at anybody else's test, and may not communicate with anybody else except, if they have a question, with their TA or lecturer.
5. After time is called, the students have to put down all writing instruments and remain in their seats, while the TAs will collect the scantrons and the exams.
6. Any violation of these rules and any act of academic dishonesty may result in severe penalties. Additionally, all violators will be reported to the Office of the Dean of Students.

I have read and understand the exam rules stated above:

STUDENT NAME: _____

STUDENT SIGNATURE: _____

1. If $f(x) = 3x^2$, find and simplify $\frac{f(a+h) - f(a)}{h}$

A. $3(2a + h)$

B. 3

C. $\frac{6}{h} + a + 3h$

D. $\frac{3(2a^2 + 2ah + h^2)}{h}$

E. $6a$

2. Find the domain of $g(x) = \frac{1}{\ln \sqrt{x-10}}$

A. $(10, \infty)$

B. $[10, \infty)$

C. (e^{11}, ∞)

D. $(10, 11) \cup (11, \infty)$

E. $[10, 11) \cup (11, \infty)$

3. The graph of a function g is obtained from the graph of f by first compressing vertically by a factor of 3, then shifting to the right by 2 units, and then shifting up by one unit. What is $g(x) =$?

- A. $f\left(\frac{x}{3} + 1\right) + 2$
- B. $f\left(\frac{x+2}{3} + 1\right)$
- C. $\frac{1}{3}f(x - 2) + 1$
- D. $3f(x + 2) - 1$
- E. $f(3(x - 2)) - 1$

4. Solve $\ln(x^2 - 9) - \ln(x - 3) = 2$

- A. $e^2 - 3$
- B. $e^2 + 3$
- C. $\frac{1}{e^2} - 3$
- D. $\frac{1}{e^2} + 3$
- E. $e + 3$

5. If $\log_b x = 16$ and $z = b^4$, what is $\log_b \frac{\sqrt{x}}{z}$?

- A. 0
- B. 1
- C. 2
- D. 4
- E. 8

6. If $f(x) = \frac{x}{1+2x}$, find $f^{-1}(1)$.

- A. 1
- B. $\frac{1}{3}$
- C. 3
- D. $-\frac{1}{3}$
- E. -1

7. Which of the following has a removable discontinuity at $x = -3$?

A. $f(x) = \frac{x^2 - 9}{x - 3}$

B. $f(x) = \frac{1}{\sqrt{x + 3}}$

C. $f(x) = \frac{x^2 - 9}{x + 3}$

D. $\ln(x + 3)$

E. $\sqrt[3]{x + 3}$

8. Determine which statements about f are true and which are false.

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

(I) f is discontinuous at 1

(II) f is continuous from the left at -1

(III) f is continuous from the right at -1

A. (I) is true; (II) and (III) are false

B. (II) is true; (I) and (III) are false

C. (III) is true; (I) and (II) are false

D. (I) and (II) are true; (III) is false

E. (II) and (III) are true; (I) is false

9. Evaluate the limit, if it exists:

$$\lim_{x \rightarrow 2} \frac{\cos\left(\frac{x^2-4}{\pi}\right)(x-2)}{\sqrt{x^2+12}-4}$$

- A. 1
- B. 2
- C. 3
- D. 4
- E. The limit does not exist

10. Evaluate the limit, if it exists:

$$\lim_{x \rightarrow 1^+} \frac{x-4}{x^2(x-1)}$$

- A. ∞
- B. -2
- C. -1
- D. 1
- E. $-\infty$

11. Choose the right statement which describes ALL the horizontal and vertical asymptotes of the function

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

- A. Horizontal Asymptote(s): $y = 1$, $y = -1$, Vertical Asymptote(s): None
 - B. Horizontal Asymptote(s): $y = 1$, Vertical Asymptote(s): $x = 1$
 - C. Horizontal Asymptote(s): $y = 1$, Vertical Asymptote(s): $x = 0$
 - D. Horizontal Asymptote(s): $y = 1$, $y = -1$, Vertical Asymptote(s): $x = 0$
 - E. Horizontal Asymptote(s): None, Vertical Asymptote(s): $x = 0$
12. The quantity $\lim_{h \rightarrow 0} \frac{\sqrt{9+h} - 3}{h}$ represents which of the following?

- A. $f'(3)$ with $f(x) = \sqrt{x}$
- B. $f'(9)$ with $f(x) = \sqrt{x}$
- C. $f'(-6)$ with $f(x) = \sqrt{x+3}$
- D. $f'(-3)$ with $f(x) = \sqrt{x+9}$
- E. $f'(6)$ with $f(x) = \sqrt{x+3}$