

MA 16100  
EXAM 1 Green  
September 22, 2015

NAME \_\_\_\_\_ YOUR TA'S NAME \_\_\_\_\_

STUDENT ID # \_\_\_\_\_ RECITATION TIME \_\_\_\_\_

1. You must use a #2 pencil on the mark-sense sheet (answer sheet).
2. Be sure the paper you are looking at right now is GREEN!
3. Write the following in the TEST/QUIZ NUMBER boxes (and blacken in the appropriate spaces below the boxes):  

01
4. On the mark-sense sheet, fill in your TA's name and the course number.
5. Fill in your NAME and STUDENT IDENTIFICATION NUMBER and blacken in the appropriate spaces.
6. Fill in your four-digit SECTION NUMBER. If you do not know your section number, please ask your TA.
7. Sign the mark-sense sheet.
8. Fill in your name, etc. on this paper (above).
9. There are 12 questions, each worth 8 points (you will automatically earn 4 points for taking the exam). Blacken in your choice of the correct answer in the spaces provided for questions 1–12. Do all your work on the question sheets.
10. Turn in both the mark-sense sheets and the question sheets when you are finished.
11. If you finish the exam before 7:20, you may leave the room after turning in the scantron sheet and the exam booklet. If you don't finish before 7:20, you MUST REMAIN SEATED until your TA comes and collects your scantron sheet and your exam booklet. You may not leave the room before 6:50.
12. NO CALCULATORS, PHONES, BOOKS, OR PAPERS ARE ALLOWED. Use the back of the test pages for scrap paper.

## 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. Find the domain of the function  $f(x) = \frac{1}{\sqrt{3 - \sqrt{x + 1}}}$ .

- A.  $(-10, 8)$
- B.  $x \neq 8$
- C.  $[-1, 8)$
- D.  $(-\infty, -1) \cup (8, \infty)$
- E.  $(-\infty, -10) \cup (-10, 8) \cup (8, \infty)$

2. Suppose the graph of the exponential function  $f(x) = ca^x$  passes through the points  $(-1, 9)$  and  $(1, 4)$  in the  $xy$ -plane. Find the value of  $c$ .

- A.  $\frac{1}{9}$
- B. 9
- C. 4
- D.  $-\frac{5}{2}$
- E. 6

3. The graph of  $y = e^x$  is translated to the right by 3 units, stretched vertically by a factor of 2, and finally vertically translated up by 5 units to obtain the graph of  $y = h(x)$ . Find a formula for  $h(x)$ .

- A.  $e^{2x-6} + 5$
- B.  $2e^{x-3} + 5$
- C.  $e^{\frac{x}{2}-\frac{3}{2}} + 5$
- D.  $2e^{x+3} + 10$
- E.  $e^{\frac{x}{2}-\frac{3}{2}} - 5$

4. If the displacement (in cm) of a particle moving back and forth on a line is given by

$$s(t) = \sin(\pi t) + 2 \cos(\pi t)$$

where  $t$  is given in seconds, then the average velocity during the time interval  $[3, 6]$  is

- A.  $4/3$  cm/sec
- B.  $6$  cm/sec
- C.  $-\pi/2$  cm/sec
- D.  $0$  cm/sec
- E.  $-3$  cm/sec

5. Find the inverse of the function

$$f(x) = \frac{3^x}{2 + \pi 3^x}.$$

A.  $f^{-1}(x) = \log_3(2x) - \log_3(1 + \pi x)$

B.  $f^{-1}(x) = \log_3(2x) - \log_3(1 - \pi x)$

C.  $f^{-1}(x) = \log_3\left(2x - \frac{2}{\pi}\right)$

D.  $f^{-1}(x) = \log_3\left(2x + \frac{2}{\pi}\right)$

E.  $f^{-1}(x) = \log_3\left(\frac{2x}{\pi + 1}\right)$

6. Select all true statements about the following function:

$$f(x) = \begin{cases} |x| & \text{if } x < 2 \\ 0 & \text{if } x \geq 2 \end{cases}$$

I.  $f(x)$  is differentiable at  $x = 0$ .

II.  $f(x)$  is continuous at  $x = 2$ .

III.  $\lim_{x \rightarrow 0} f(x)$  exists.

A. II and III

B. I and II

C. I only

D. III only

E. None of the statements are true

7. Find values for the constants  $a$  and  $b$  that make  $f(x)$  continuous for all values of  $x$ .

$$f(x) = \begin{cases} \frac{x^2-1}{x-1} & \text{if } x < 1 \\ ax + b & \text{if } 1 \leq x \leq 3 \\ x^2 - 1 & \text{if } x > 3 \end{cases}$$

- A.  $a = 3, b = -1$
- B.  $a = 2, b = 8$
- C.  $a = 1, b = 1$
- D.  $a = 2, b = 2$
- E. No values of  $a$  and  $b$  will make the function  $f$  continuous everywhere

8. Evaluate the following limit:

$$\lim_{x \rightarrow \infty} (\sqrt{16x^2 + x} - 4x)$$

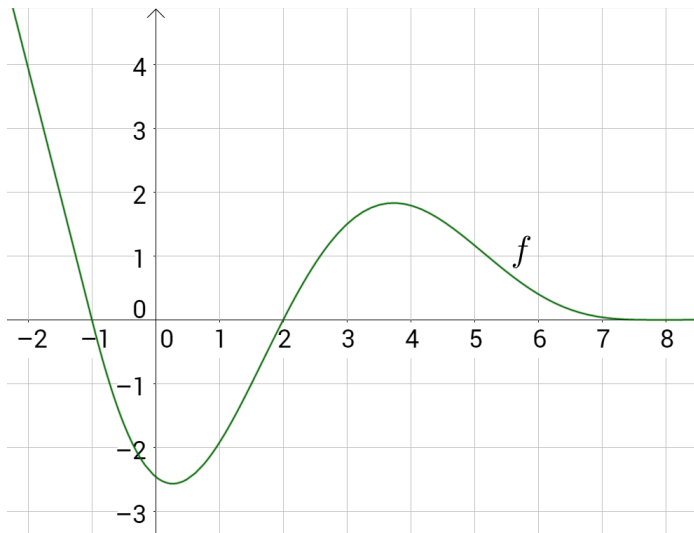
- A.  $\infty$
- B.  $\frac{1}{8}$
- C. 0
- D. 4
- E.  $\frac{1}{4}$

9. How many vertical and horizontal asymptotes does the following function have?

$$f(x) = \frac{3x^2 + x - 1}{x^2 + x - 6}$$

- A. 2 horizontal and 2 vertical asymptotes
- B. 2 horizontal and 1 vertical asymptotes
- C. 1 horizontal and 2 vertical asymptotes
- D. 1 horizontal asymptote
- E. 2 horizontal asymptotes

10. The graph of  $y = f(x)$  is given below. Choose the correct ordering for the values of  $f'$ .



- A.  $f'(-2) < f'(1) < f'(4) < f'(8)$
- B.  $f'(1) < f'(8) < f'(4) < f'(-2)$
- C.  $f'(-2) < f'(4) < f'(1) < f'(8)$
- D.  $f'(1) < f'(8) < f'(-2) < f'(4)$
- E.  $f'(-2) < f'(4) < f'(8) < f'(1)$

11. Find the equation of the tangent line to  $f(x) = \frac{1}{x}$  at  $x = 2$ .

A.  $y = -\frac{x}{4} + \frac{1}{2}$

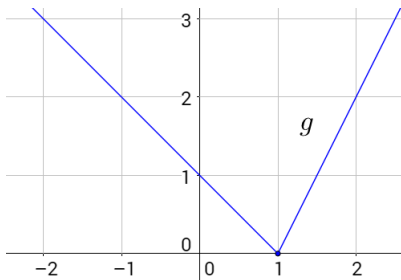
B.  $y = -\frac{x}{2} + \frac{1}{2}$

C.  $y = -\frac{x}{2} + 1$

D.  $y = -\frac{x}{4} + 1$

E.  $y = \frac{x}{2} - \frac{1}{2}$

12. Given the graph of  $y = g(x)$  below, find the one-sided limit,  $\lim_{h \rightarrow 0^+} \frac{g(1+h) - g(1)}{h}$ .



A. 0

B. 1

C. 2

D. -1

E. Does not exist