

MAC 2311

Exam 2

A. Sign your scantron sheet in the white area on the back.

B. Write **and code** in the spaces indicated:

1) Name (last name, first initial, middle initial)

2) UF ID number

3) Discussion Section number

C. Under "special codes", code in the test number 3, 3.

1 2 • 4 5 6 7 8 9 0

1 2 • 4 5 6 7 8 9 0

D. At the top right of your answer sheet, for "Test Form Code" encode A.

• B C D E

E. This test consists of multiple choice and free response questions. Make sure you check for errors. In the tear off sheet part you need to show full work in order to receive credit. The time allowed is 90 minutes.

F. WHEN YOU ARE FINISHED:

1) Before turning in your test check for **transcribing errors**. Any mistakes you leave in are there to stay.

2) You must turn in your free response exam and scantron to your proctor. **Be prepared to show your picture ID with a legible signature.**

Calculus I: MAC2311
Fall 2019
Midterm 2 A
10/15/2019
Time Limit: 1 Hour 30 Minutes

Name: _____

Section: _____

UF-ID: _____

It is your responsibility to ensure that your test has **19 questions**. If it does not, show it to your proctor immediately. You will not be permitted to make up any problems omitted from your test after the testing period ends. There are a total of 105 points available on this exam.

Part I Instructions: 14 multiple choice questions. Complete the scantron sheet provided with your information and fill in the appropriate spaces to answer your questions. Only the answer on the scantron sheet will be graded. Each problem is worth five (5) points for a total of 70 points on Part I.

1. Consider the function $f(x) = \cot(x)$. Which of the following is the expression for $f''(x)$?

- (A) $\csc(x) \cot(x)$ (B) $2 \csc(x) \cot(x)$ (C) $2 \csc^2(x) \cot(x)$ (D) $2 \csc(x) \cot^2(x)$

2. Let $f(x) = \ln\left(\frac{x^2\sqrt{x+1}}{x-1}\right)$. What is the value of $f'(2)$?

- (A) $\frac{1}{4\sqrt{3}}$ (B) $\frac{1}{6}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{4}{3}$ (E) None of these

3. Find $f'(x)$ for $f(x) = \sqrt{x} + 3\sqrt[3]{x} + 2\sqrt[4]{x^3}$.

$$(A) f'(x) = \frac{1}{2\sqrt{x}} + \frac{1}{\sqrt[3]{x^2}} + \frac{3}{2\sqrt[4]{x}}$$

$$(B) f'(x) = \sqrt{x} + 3\sqrt[3]{x} + 6\sqrt[4]{x^2}$$

$$(C) f'(x) = \frac{1}{2\sqrt{x}} + \frac{1}{\sqrt[3]{x}} + \frac{3}{2\sqrt[4]{x^3}}$$

$$(D) f'(x) = 2x + 9x^2 + \frac{8}{3}\sqrt[3]{x}$$

$$(E) f'(x) = -\frac{2}{\sqrt{x}} - \frac{9}{\sqrt[3]{x}} - \frac{8}{\sqrt[4]{x}}$$

4. What is the slope of the line tangent to the graph $y = (5 - 3x)^x$ when $x = 1$?

$$(A) -6\ln(2)$$

$$(B) -3$$

$$(C) 2\ln(2) - 3$$

$$(D) 4 - \ln(2)$$

$$(E) \text{None of these}$$

5. Consider the following properties for a function $f(x)$

- The domain of $f(x)$ is all real numbers.
- For all x we have $f(x) > 0$.
- $f(0) = 1$.
- For all x we have $f'(x) > 0$.

Which of the following functions satisfies all four properties?

$$(A) f(x) = x^2 + 1$$

$$(B) f(x) = \ln(x)$$

$$(C) f(x) = \arctan(x)$$

$$(D) f(x) = e^x$$

$$(E) f(x) = \cos(x)$$

Use the table below to answer questions 6 and 7.

x	f	f'	g	g'
0	2	1	-2	5
1	2	-1	3	-1
2	1	-3	-1	0
3	5	4	0	1

6. Let $A(x) = \frac{f(x)}{g(x)}$. Use the table to find $A'(0)$.

- (A) 0 (B) 3 (C) $\frac{5}{4}$ (D) -3 (E) -4

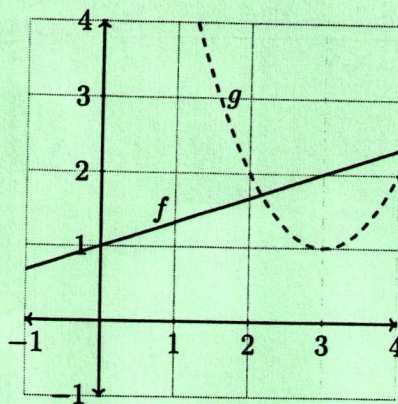
7. Let $B(x) = f(g(x))$. Use the table to find $B'(1)$.

- (A) 20 (B) 0 (C) 4 (D) -4 (E) None of the above

8. Evaluate $f'(\ln(\frac{1}{2}))$ where $f(x) = \arcsin(e^x)$, ($f(x) = \sin^{-1}(e^x)$).

- (A) $\frac{2}{\sqrt{3}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{\sqrt{3}}{4}$ (D) $\frac{\sqrt{3}}{2}$ (E) None of these

Use the following graph to answer the next question.



9. Let $f(x)$ and $g(x)$ be as in the graph above. If $H(x) = f(x) + g(x)$ find $H'(3)$.

- (A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) $\frac{4}{3}$ (E) 0

10. If $f(x) = \arctan(x)$, ($f(x) = \tan^{-1}(x)$), which of the following is equal to $f''(\sqrt{3})$?

- (A) $\frac{\sqrt{3}}{16}$ (B) $-\frac{1}{8}$ (C) $-\frac{\sqrt{3}}{16}$ (D) $-\frac{\sqrt{3}}{4}$ (E) $-\frac{\sqrt{3}}{8}$

11. At what point in the first quadrant does the graph of the curve $x^2 - xy + y^2 = 1$ have a horizontal tangent line?

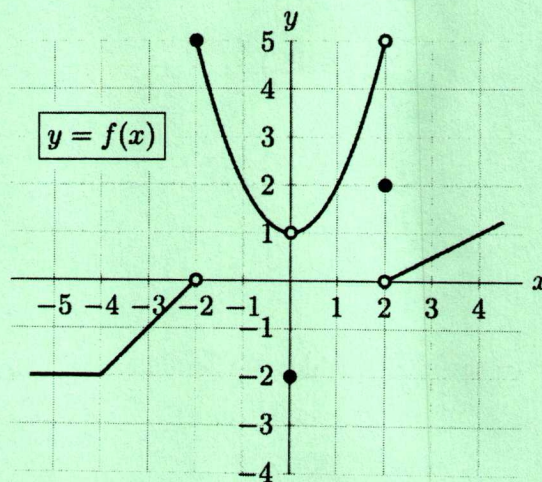
- (A) $\left(\frac{1}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right)$ (B) $\left(\frac{2}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$ (C) (0, 1) (D) (1, 1) (E) None of these

12. Which of the following is equal to

$$\lim_{h \rightarrow 0} \left(\frac{x \sin(2x + 2h) - x \sin(2x)}{h} + \sin(2x + 2h) \right)?$$

- (A) $\cos(2x) + 2x \sin(2x)$
 (B) $x \sin(2x)$
 (C) $\sin(2x) + 2x \cos(2x)$
 (D) $\sin(2x) + x(\cos(2x) + \sin(2x))$

13. Below is a graph for $y = f(x)$.



At how many points does the graph fail to be differentiable on the interval $(-5, 1)$?

- (A) 0 (B) 1 (C) 2 (D) 3

14. Suppose that the functions $f(x)$ and $g(x)$ are differentiable and that

$$f(3) = 2, \quad f'(3) = -4, \quad g(3) = 1, \quad \text{and} \quad g'(3) = 5.$$

Use this to determine $h'(3)$ where

$$h(x) = \ln(f(x)g(x))$$

- (A) -10 (B) $-\frac{3}{2}$ (C) 0 (D) 6 (E) None of these