MAC 2311

Exam 1

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 1 A
9/17/2019
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. Let $f(x) = \sin(x)$. Which of the following is equal to $f'(1)$?

(A) $\lim_{h\to 1} \dfrac{\sin(1+h) - \sin(1)}{h}$

(B) $\lim_{h\to 1} \dfrac{\sin(1+h) - \sin(h)}{h}$

(C) $\lim_{h\to 0} \dfrac{\sin(1+h) - \sin(h)}{h}$

(D) $\lim_{h\to 0} \dfrac{\sin(1+h) - \sin(1)}{h}$

2. If $f(x) = cx + b$ where c and b are constants, then $f'(x) = 0$

(A) only when $c = 0$

(B) only when $b = 0$

(C) only when both b and c equal 0

(D) for all values of c and b

(E) $f'(x)$ is never equal to zero

3. Let $f(x)$ and $g(x)$ be functions such that

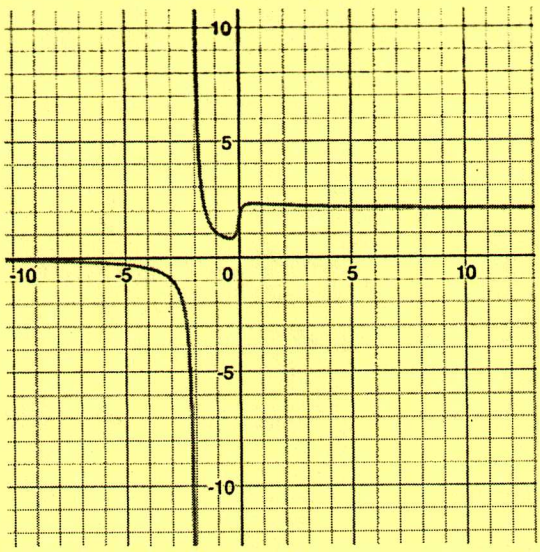
$$\lim_{x\to 3} f(x) = -1 \text{ and } \lim_{x\to 3} g(x) = 2$$

What is the value of the limit

$$\lim_{x\to 3}\left(2xf(x)g(x) + \frac{2^x}{g(x)}\right)?$$

(A) -8 (B) -4 (C) 0 (D) 2 (E) DNE

4. Consider the following graph for the function $f(x)$



What are the horizontal asymptote(s) for $f(x)$?

(A) $y = 0$ (B) $y = 0$ and $y = 2$ (C) $y = -2$ (D) $x = 0$

5. What is the total number of vertical and horizontal asymptotes that the function $f(x) = \dfrac{x^3 - 4x}{x^3 - 2x^2 + x}$ has?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

6. Assume $5 - x^2 \leq f(x) \leq 5 + \sin(3x)$. Find $\lim_{x \to 0} f(x)$.

(A) 0 (B) 3 (C) 5 (D) -5 (E) DNE

7. If $f(x) = \begin{cases} x^2 - 2, & x \leq a \\ 2x + 1, & x > a \end{cases}$, for which of the following values of a will $\lim_{x \to a} f(x)$ exist?

(A) 0 (B) -1 (C) 2 (D) -2 (E) None of the above

8. If the position of a particle is $s(t) = t^3 + 1$, find the average velocity from $t = -1$ to $t = 1$.

(A) -1 (B) 0 (C) 1 (D) 2 (E) Not enough information to compute

9. Suppose the function $f(x)$ is continuous for all real numbers, $f(-3) = 4$, and $f(1) = 2$. Consider the following three statements.

(*i*) There is a number a such that $f(a) = 3$

(*ii*) $\lim_{x \to 1^+} f(x) = 2$

(*iii*) $f(e^x)$ is continuous for all real numbers

Which of the above statements is true?

(*A*) (*ii*) (*B*) (*i*) and (*ii*) (*C*) (*ii*) and (*iii*) (*D*) (*i*), (*ii*), and (*iii*) (*E*) None of these

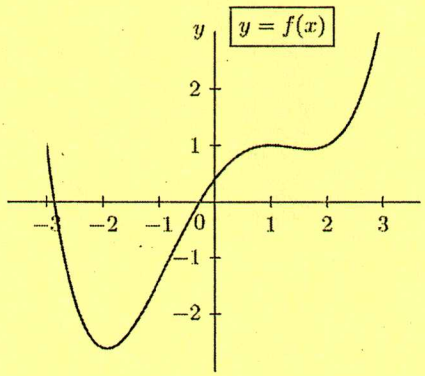
10. Which of the following functions has a jump discontinuity?

(*A*) $f(x) = \dfrac{x+3}{|x+3|}$ (*B*) $g(x) = \ln(x)$ (*C*) $h(x) = \cos\left(\dfrac{1}{x}\right)$ (*D*) $j(x) = \dfrac{x^3 - 27}{x - 3}$ (*E*) None of these

11. Let $f'(3) = 2$ and let $(3, -1)$ be a point on the graph of $f(x)$. Find the equation of the tangent line to the graph of $f(x)$ at $x = 3$.

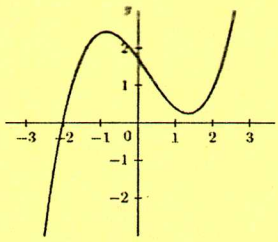
(*A*) $y = 3x - 1$ (*B*) $y = 2x + 7$ (*C*) $y = 2x - 7$ (*D*) $-3x + 1$

12. Below is the graph of the function $f(x)$:

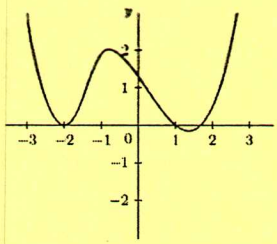


Select the derivative of $f(x)$.

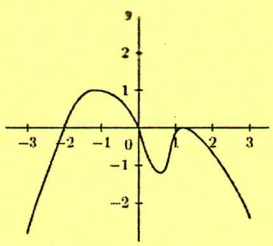
(A)



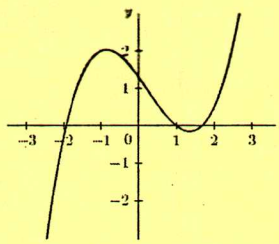
(B)



(C)



(D)



13. Let $s(t)$ and $v(t)$ be position and velocity functions, respectively. Which of the following pairs of functions $s(t)$ and $v(t)$ are possible position and velocity functions?

(*i*) $s(t) = 8t + 7, \quad v(t) = 4t^2 + 7t$

(*ii*) $s(t) = t + \pi, \quad v(t) = 1$

(*iii*) $s(t) = 7, \quad v(t) = 0$

(*A*) (*i*) (*B*) (*ii*) (*C*) (*i*), (*ii*), and (*iii*) (*D*) (*ii*) and (*iii*) (*E*) (*iii*)

14. On which of the following intervals is the equation $x^3 - 4x^2 + 5x = 1$ guaranteed to have a solution according to the Intermediate Value Theorem?

(*A*) $[-2, -1]$ (*B*) $[-1, 0]$ (*C*) $[0, 1]$ (*D*) $[1, 2]$ (*E*) $[2, 3]$