MAC 2233
Fall 2019

EXAM 2B

A. Sign your bubble sheet on the back at the bottom <u>in ink</u>.

B. In pencil, write and encode in the spaces indicated:

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

    2) UF ID Number

    3) Section Number

C. Under "special codes", code in the test ID number 2, 2.

    1 ● 3 4 5 6 7 8 9 0

    1 ● 3 4 5 6 7 8 9 0

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

    A ● C D E

E.   1) This test consists of 6 three-point and 8 five-point multiple choice questions and two pages (both sides) of free reponse questions worth 30 points. The test is counted out of 80 points, but there are eight bonus points available for a total of 88 points on the exam.

    2) The time allowed is 90 minutes.

    3) You may write on the test.

    4) Raise your hand if you need more scratch paper or if you have a problem with your test. DO NOT LEAVE YOUR SEAT UNLESS YOU ARE FINISHED WITH THE TEST.

F. **KEEP YOUR BUBBLE SHEET COVERED AT ALL TIMES.**

G. When you are finished:

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

    2) Bring your test, scratch paper, bubble sheet, and any tearoff sheets to your discussion leader or proctor to turn them in. Be prepared to show your UF ID card.

    3) Answers will be posted in CANVAS after the test. Grades will be posted within one week.

| Multiple Questions are worth 4 points each. |

Use the graph of $f(x)$ below to answer questions 1–3
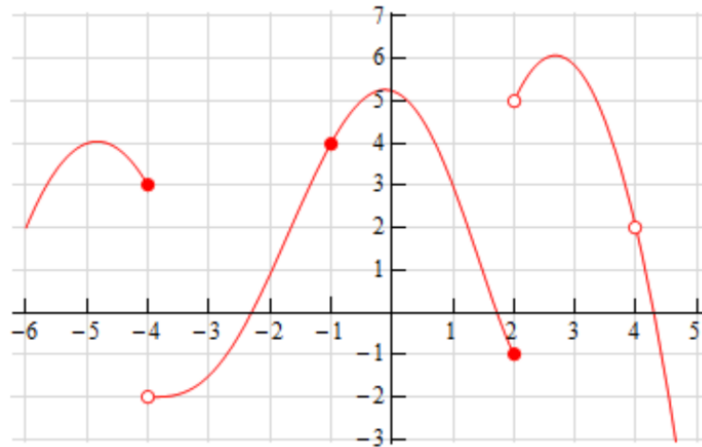
1. Find $\lim\limits_{x \to -4^+} f(x)$

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

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2. How many discontinuities does $f(x)$ have?

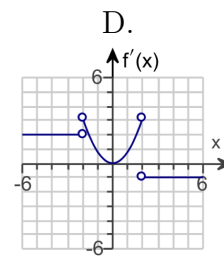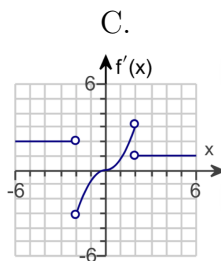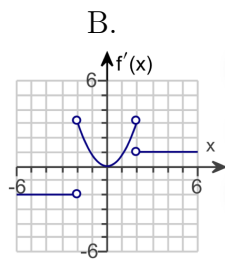   A. 0   B. 1   C. 2   D. 3   E. 4
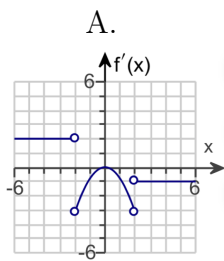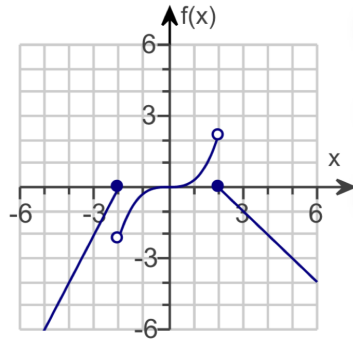
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3. Find $\lim\limits_{x \to 4} f(x)$

   A. 0   B. 3   C. 2   D. 1   E. DNE

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4. If $f(2) = 3$ and $f'(2) = -1$, what is the equation of the line tangent to the graph of $y = f(x)$ at $x = 2$.

   A. $y = -x + 2$ B. $y = 5 - x$ C. $y = 3x - 1$

   D. $y = 3x + 2$ E. $y = 3 - x$

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5. Match the graph of $f(x)$ with it's derivative $f'(x)$

A.

B.

C.

D.

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6. Calculate the limit
$$\lim_{x \to 4} \frac{-x^2 + 6x - 8}{x - 4}$$

A.   B. 2   C. -2 D. 2   E. 4

2 DNE

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7. Let

$$f'(2) = 3 \qquad f(2) = 4 \qquad f(4) = -1 \qquad f'(4) = -4$$
$$g(4) = 2 \qquad g'(4) = 1 \qquad g(2) = -2 \qquad g'(2) = 5$$

Let $h(x) = (f \circ g)(2x)$. Find $h'(2)$

A. 2   B. 6   C. -8 D. 3   E. 0

8. Which of the following functions have a root between -1 and 2?

   i. $f(x) = x^2 + 1$

   ii. $g(x) = e^x - 1$

   iii. $k(x) = x^2 + x + 2$

   A. i only   B. ii only   C. i and iii

   D. all of the above   E. none of the above

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9. Let

   $$f'(2) = 3 \qquad f(2) = 4 \qquad f(4) = -1 \qquad f'(4) = -4$$
   $$g(4) = 2 \qquad g'(4) = 1 \qquad g(2) = -2 \qquad g'(2) = 5$$

   Let $p(x) = \dfrac{x^2 f(x)}{g(x)}$. Find $p'(2)$

   A. 6   B. -34 C. -8 D. $\dfrac{5}{4}$ E. $-\dfrac{5}{4}$

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10. What value of k will make $f(x)$ continous from $(-\infty, \infty)$?

    $$f(x) = \begin{cases} 7x - 2 & x \leq 1 \\ kx^2 & x > 1 \end{cases}$$

    A. -2 B. 5   C. 0   D. 7   E. 0

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11. What is the value of the following limit: $\displaystyle\lim_{x \to \infty} \dfrac{x^2 - 6x + 3}{x + 2x^2 + 7}$?

    A. 1   B. 0   C. ∞ D. $\dfrac{1}{2}$ E. DNE

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12. State the equations of all horizontal asymptotes for a function $f(x)$ satisfying the following conditions.

$f(0) = 0$, $\lim\limits_{x \to \infty} f(x) = 2$, $\lim\limits_{x \to -\infty} f(x) = \infty$, $\lim\limits_{x \to 3^-} f(x) = -\infty$, $\lim\limits_{x \to 3^+} f(x) = \infty$, $\lim\limits_{x \to -5} f(x) = -\infty$

A. $x = 3$ and $x = -5$ B. $y = 3$ and $y = -5$ C. $x = 2$ and $y = 3$

D. $y = 2$ E. $y = 0$

13. Let f be the piecewise function defined below. Which of the following statements about f are true.

$$f(x) = \begin{cases} \dfrac{x^2 - 4}{x - 2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2 \end{cases}$$

I. $\lim\limits_{x \to 2} f(x)$ exists

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

III. $f(x)$ is differentiable at $x = 2$

A. I only   B. I and II   C. I and III

D. All of the Above   E. None of the Above

Section # _____   Name _____

UF ID # _____   Signature _____

YOU MUST SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. Let $f(x) = \sqrt{2 + 3x}$. Use the **limit definition of the derivative** to find $f'(1)$. (NOTE: No credit will be given if another method is used.)

2. Let $f(x) = \dfrac{x^2 + 3x - 1}{x - 2}$

    (a) Find $f'(x)$

    (b) Find the equation of the tangent line to $f(x)$ at $x = 3$

3. Let $f(x) = \sqrt{x^2 - 4x + 13}$.

    (a) At which x values does $f(x)$ have horizontal tangent lines?

    (b) Write the equation of the horizontal tangent line(s).

4. Consider the function
$$f(x) = \frac{3x + x^2}{x^2 - 2x}$$

(a) List each value of x at which $f(x)$ is discontinous, and describe each as removable, jump or infinite discontinuity.

(b) List all of the vertical and horizontal asymptotes. You **MUST** support your answers with limits.