Math 141 Exam 1 Fall 2019

Make sure you fill in your answers clearly on the scantron answer sheet provided. Fill in your name, student ID number, and exam version on the answer sheet.You may use this exam to work out the problems. You must hand in this exam as well as the scantron answer sheet. When you hand in your exam, be prepared to show your picture ID. No notes or formula sheets are allowed for this exam. Approved calculators such as TI-83 or TI-84 calculators are permitted for this exam, however TI-89 calculators and any CAS calculators are prohibited. No cell phones are permitted outside your bag at any time during the exam.

Name, and section: _____
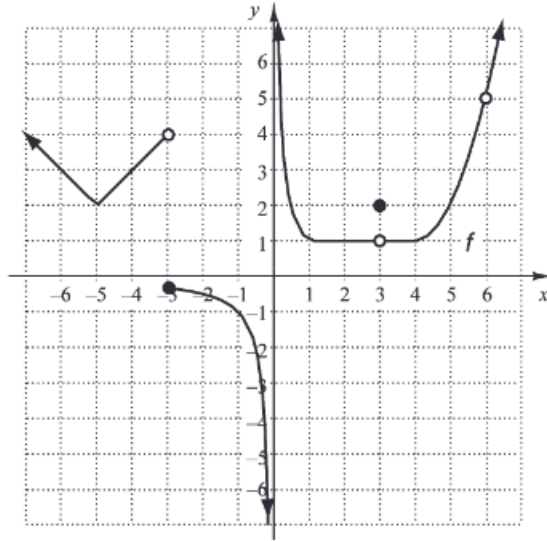
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Exam version: B

Figure 1: Use this graph to answer questions 1-6.

[1] What is $\lim_{x \to 3^-} f(x)$?

A. 1   B. 2   C. undefined   D. none of the above

[2] What is $\lim_{x \to 3^+} f(x)$?

A. 0   B. -1   C. undefined   D. none of the above

[3] What is $\lim_{x \to 3} f(x)$?

A. 2   B. 1   C. does not exist   D. None of the above

[4] What is $f(3)$?

A. undefined   B. 2   C. 1   D. none of the above

[5] What is $\lim_{x \to 6} f(x)$?

A. 3   B. 4   C. 5   D. does not exist

[6] What is $\lim_{x \to -3} f(x)$?

A. 4   B. 0   C. -1   D. does not exist

[7] Compute $\lim\limits_{x \to 2} \dfrac{3x^2 + x - 14}{x^2 - 4}$.

A. $\frac{13}{4}$ B. $-\frac{13}{4}$ C. 0   D. does not exist

[8] Compute $\lim\limits_{x \to -2} \dfrac{x^2 - 2x - 8}{x^2 - 4}$.

A. $\frac{3}{2}$ B. $-\frac{3}{2}$ C. 0   D. does not exist

[9] Is the function given by
$$G(x) = \begin{cases} \frac{1}{3}x + 4, & \text{for } x \le 3, \\ 2x - 5, & \text{for } x > 3, \end{cases}$$
continuous at $x = 3$? Why or why not?

    A. Yes, $G(x)$ is continuous at $x = 3$ because $\lim\limits_{x \to 3} G(x) = G(3)$.

    B. No, $G(x)$ is not continuous at $x = 3$ because $\lim\limits_{x \to 3} G(x)$ does not exist.

    C. No, $G(x)$ is not continuous at $x = 3$ because $G(3)$ is undefined.

    D. No, $G(x)$ is not continuous at $x = 3$ because $\lim\limits_{x \to 3} G(x) \neq G(3)$.

[10] Compute and simplify the difference quotient $\dfrac{f(x+h) - f(x)}{h}$ for $f(x) = x^2 + 4x - 3$.

    A. $2x + 4$

    B. $2x + 4 + h$

    C. $2x + 4 + h + \frac{8x-6}{h}$

    D. $4 + h + \frac{8x-6}{h}$

[11] Find an equation of the tangent line to the graph of $y = x^2 - \sqrt{x}$ at the point $(1, 0)$.

    A. $y = \frac{5}{2}x - \frac{5}{2}$

    B. $y = \frac{5}{2}x + \frac{5}{2}$

    C. $y = \frac{3}{2}x - \frac{3}{2}$

    D. $y = \frac{3}{2}x + \frac{3}{2}$

[12] If $y = 3x - 2$ is the equation of the tangent line to the graph of $y = f(x)$ at $x = 1$, then

    A. $f(1) = 1$ and $f'(1) = 3$

    B. $f(1) = 5$ and $f'(1) = 3$

    C. $f(1) = 1$ and $f'(1) = -2$

    D. $f(1) = 1$ but there is not enough information to determine $f'(1)$.

[13] Which of the following is equal to the derivative $f'(x)$ of a function $f(x)$?

    A. $\dfrac{f(x+h) - f(x)}{h}$

    B. $\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

    C. $\dfrac{f(x) + h - f(x)}{h}$

    D. $\lim\limits_{h \to 0} \dfrac{f(x) + h - f(x)}{h}$

[14] If $f(x) = 4x^2 - 5x + 2$, find $f'(x)$.

    A. $\frac{4}{3}x^3 - \frac{5}{2}x^2$

    B. $\frac{4}{3}x^3 - \frac{5}{2}x^2 + 3x$

    C. $8x - 5$

    D. $4x - 5$

[15] If $y = \sqrt[3]{x} - \frac{4}{x}$, find $\frac{dy}{dx}$.

    A. $\frac{1}{3}x^{-2/3} + 4x^{-2}$

    B. $\frac{1}{3}x^{-2/3} - 4x^{-2}$

    C. $\frac{1}{3}x^{4/3} + 4$

    D. $\frac{1}{3}x^{4/3} - 4$

[16] For $y = \sqrt{2 - 3x}$, find $\dfrac{dy}{dx}$.

    A. $\dfrac{1}{2\sqrt{2 - 3x}}$

    B. $\dfrac{3}{2\sqrt{2 - 3x}}$

    C. $\dfrac{-1}{2\sqrt{2 - 3x}}$

    D. $\dfrac{-3}{2\sqrt{2 - 3x}}$

[17] Differentiate $f(x) = (3x^2 - 2x + 5)(4x^2 + 3x - 1)$.

    A. $(6x - 2)(8x + 3)$

    B. $(3x^2 - 2x + 5)(4x^2 + 3x - 1) + (6x - 2)(8x + 3)$

    C. $(3x^2 - 2x + 5)(8x + 3) + (4x^2 + 3x - 1)(6x - 2)$

    D. $(3x^2 - 2x + 5)(8x + 3) - (4x^2 + 3x - 1)(6x - 2)$

[18] Differentiate $f(x) = \dfrac{x - 2}{3 - 5x}$.

    A. $\dfrac{13}{(3 - 5x)^2}$

    B. $\dfrac{13 - 10x}{(3 - 5x)^2}$

    C. $\dfrac{x - 2}{(3 - 5x)^2}$

    D. $\dfrac{-7}{(3 - 5x)^2}$

[19] Differentiate $f(x) = (3x - 1)^7(2x + 1)^5$.

    A. $10(3x - 1)^7(2x + 1)^4 + 21(3x - 1)^6(2x + 1)^4$

    B. $5(3x - 1)^7(2x + 1)^4 + 7(3x - 1)^6(2x + 1)^4$

    C. $210(3x - 1)^6(2x + 1)^4$

    D. $35(3x - 1)^6(2x + 1)^4$

[20] Differentiate $f(x) = \left(\dfrac{x - 4}{x + 4}\right)^5$.

    A. $\dfrac{(x - 4)^4}{(x + 4)^4}$

    B. $\dfrac{5(x - 4)^4}{(x + 4)^4}$

    C. $\dfrac{40(x - 4)^4}{(x + 4)^6}$

    D. $\dfrac{2560}{(x + 4)^8}$