5 for 5 Derivatives

x	0	2	7	9
$g(x)$	-3	-4	-1	-2
$g'(x)$	4	-2	-8	5

1. Selected values of a twice differentiable function, $g(x)$, and its derivative are shown above. Consider the differentiable function h, defined by $h(x) = \sec x \, g(x)$. Find $h'(0)$.

   A. 0
   B. 1
   C. 4
   D. undefined

2. What is the slope of the line tangent to $y = 3 \ln x - \frac{5}{x}$ at $x = 2$?
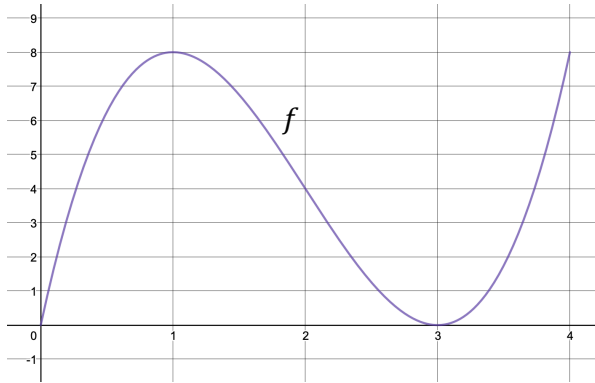
   A. 11/4
   B. 2
   C. 1/4
   D. $3 \ln 2 - 5/4$

3. Which of the following statements is true for the function $f(x)$ defined below?
$$f(x) = \begin{cases} 5x^2 - 8x & for\ x \le 1 \\ \ln x - 3 & for\ x > 1 \end{cases}$$
   A. $\lim\limits_{x \to 1^-} f(x) \ne \lim\limits_{x \to 1^+} f(x)$

   B. There is a removable discontinuity at $x = 1$.

   C. $f(x)$ is continuous and differentiable at $x = 1$.

   D. $f(x)$ is continuous but not differentiable at $x = 1$.

4. The graph of $f(x)$ is shown for $0 \leq x \leq 4$. Put the following in order from least to greatest.

I. $\lim\limits_{h \to 0} \dfrac{f(2+h)-f(2)}{h}$ II. Average rate of change of f on $[2,4]$ III. $\lim\limits_{x \to 3} \dfrac{f(x)-f(3)}{x-3}$ IV. $\dfrac{f(3)-f(2)}{3-2}$

    A.   I, II, III, IV
    B.   I, IV, III, II
    C.   IV, I, III, II
    D.   IV, II, I, III

5. Line L is tangent to $y = 5x^2 + 8x$ and parallel to $12x + y = 4$. What is the y-intercept of line L?

    A. 4
    B. 8
    C. -20
    D. 28

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