Unit 2 Progress Check: MCQ Part B

1. Let g be the function given by $g(x) = x^4 - 2x^3 - 3x$. What are all values of x such that $g'(x) = \frac{1}{2}$?

(A) -4.00

(B) 1.746

(C) 1.777 ✓

(D) -0.164 and 2.508

2. Let f be the function given by $f(x) = 2x^3 + x^2 - 3$. What is the value of $f'(2)$?

(A) 56

(B) 28 ✓

(C) 25

(D) 10

3. If $f(x) = 5x^6 - 3x^5 + 2x^3 - x^2 + e^3$, then $f'(x) =$

(A) $5x^5 - 3x^4 + 2x^2 - x$

(B) $30x^5 - 15x^4 + 6x^2 - 2x$ ✓

(C) $30x^5 - 15x^4 + 6x^2 - 2x + 3e^2$

(D) $30x^6 - 15x^5 + 6x^3 - 2x^2$

4. If $g(x) = 3\sin x + 2\cos x + 5$, then $g'\left(\frac{\pi}{3}\right) =$

(A) $\frac{3}{2} - \sqrt{3}$ ✓

(B) $-\frac{3}{2} + \sqrt{3}$

(C) $\frac{3}{2} + \sqrt{3}$

(D) $6 + \frac{3}{2}\sqrt{3}$

5. Let g be the function given by $g(x) = \lim_{h \to 0} \frac{\cos(x+h) - \cos x}{h}$. What is the instantaneous rate of change of g with respect to x at $x = \frac{\pi}{3}$?

(A) $\frac{\sqrt{3}}{2}$

(B) $\frac{1}{2}$

(C) $-\frac{1}{2}$ ✓

(D) $-\frac{\sqrt{3}}{2}$

6. $\lim_{h \to 0} \frac{7e^x - 7e^{x+h}}{4h} =$

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(A) $-7e^x$

(B) $7e^x$

(C) $-\frac{7}{4}e^x$ ✓

(D) $\frac{7}{4}e^x$

7. The function f is given by $f(x) = \big(2x^3 + bx\big)g(x)$, where b is a constant and g is a differentiable function satisfying $g(2) = 4$ and $g'(2) = -1$. For what value of b is $f'(2) = 0$?

(A) -8

(B) $-\frac{56}{3}$

(C) -24

(D) -40 ✓

8.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	1	5	2	4

The table above gives the values of the differentiable functions f and g and their derivatives at $x = 2$. What is the value of $\frac{d}{dx}\big(f(x)g(x)\big)$ at $x = 2$?

(A) 6

(B) 13

(C) 14 ✓

(D) 20

9. If $f(x) = \frac{1}{x} \cdot \cos x$, then $f'(x) =$

(A) $\frac{\sin x}{x^2}$

(B) $\frac{-1-x^2 \sin x}{x^2}$

(C) $\frac{-\cos x - x \sin x}{x^2}$ ✓

(D) $\frac{-\cos x + x \sin x}{x^2}$

10. If $f(x) = \frac{3x^2-2}{4x+1}$, then $f'(-1) =$

(A) $-\frac{14}{3}$

(B) $-\frac{3}{2}$

(C) $\frac{14}{9}$ ✓

(D) $\frac{22}{9}$

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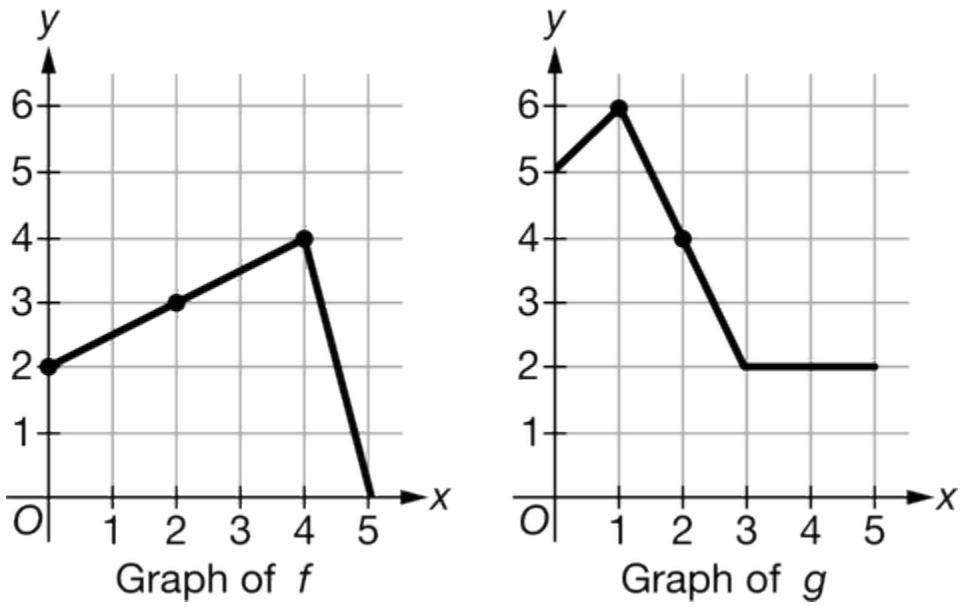
11.



The graphs of the functions f and g are shown above. If $h(x) = \frac{f(x)+1}{g(x)+3x}$, then $h'(2) =$

(A) $\frac{1}{2}$

(B) $\frac{9}{100}$

(C) $\frac{1}{100}$ ✓

(D) $\frac{1}{10}$

12. What is the slope of the line tangent to the graph of $y = \frac{4x^3}{x+3}$ at $x = 1$?

(A) 1

(B) $\frac{11}{4}$ ✓

(C) $\frac{13}{4}$

(D) 12

13. $\frac{d}{dx}(\cot x) =$

(A) $-\tan x$

(B) $\sec^2 x$

(C) $\tan x$

(D) $-\csc^2 x$ ✓

14. $\frac{d}{dx}(\sin x \cdot \csc x) =$

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(A) 0 ✓

(B) 1

(C) $-\cot^2 x$

(D) $2 \cot x$

15. Below is an attempt to derive the derivative of $\csc x$ using the product rule, where x is in the domain of $\csc x$. In which step, if any, does an error first appear?

Step 1: $\csc x \cdot \sin x = 1$
Step 2: $\frac{d}{dx}(\csc x \cdot \sin x) = 0$
Step 3: $\frac{d}{dx}(\csc x) \cdot \sin x + \csc x \cdot \cos x = 0$
Step 4: $\frac{d}{dx}(\csc x) = \frac{-\csc x \cdot \cos x}{\sin x} = -\csc x \cdot \cot x$

(A) Step 1

(B) Step 2

(C) Step 3

(D) There is no error. ✓