Unit 2 Progress Check: MCQ Part A

1. The derivative of a function f is given by $f'(x) = 0.1x + e^{0.25x}$. At what value of x for $x > 0$ does the line tangent to the graph of f at x have slope 2 ?

(A) 0.512

(B) 1.849

(C) 2.287 ✓

(D) 8.113

2.

x	0	1
$f(x)$	1	2

Let f be the function given by $f(x) = 2^{x^3}$. Selected values of f are given in the table above. If the values in the table are used to approximate $f'(0.5)$, what is the difference between the approximation and the actual value of $f'(0.5)$?

(A) 0

(B) 0.433 ✓

(C) 0.567

(D) 1

---

3. Let f be the function given by $f(x) = \frac{1}{7}x^7 + \frac{1}{2}x^6 - x^5 - \frac{15}{4}x^4 + \frac{4}{3}x^3 + 6x^2$. Which of the following statements is true?

Unit 2 Progress Check: MCQ Part A

(A) $f'(-3.1) < f'(-1.5) < f'(0.4)$

(B) $f'(-3.1) < f'(0.4) < f'(-1.5)$

(C) $f'(-1.5) < f'(0.4) < f'(-3.1)$

(D) $f'(0.4) < f'(-1.5) < f'(-3.1)$ ✓

4.

x	1	2	3	4	5
$f(x)$	2	3	5	6	14

Selected values of a function f are shown in the table above. What is the average rate of change of f over the interval $[1, 5]$?

(A) $\frac{5-1}{14-2}$

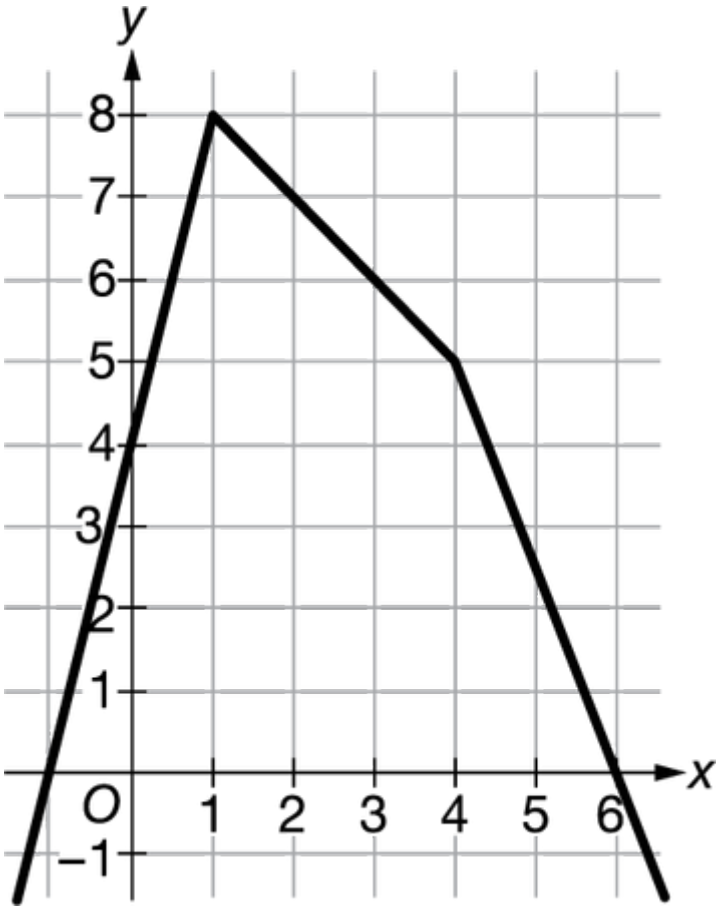
(B) $\frac{14+2}{5+1}$

(C) $\frac{14-2}{5-1}$ ✓

(D) $\frac{2+3+5+6+14}{5}$

Unit 2 Progress Check: MCQ Part A

5.



The graph of the function f, shown above, consists of three line segments. What is the average rate of change of f over the interval $-1 \leq x \leq 6$?

(A) $-\frac{5}{2}$

(B) 0 ✓

(C) $\frac{1}{6}$

(D) 4

---

6. The function f is given by $f(x) = 1 + 3\cos x$. What is the average rate of change of f over the interval $[0, \pi]$?

Unit 2 Progress Check: MCQ Part A

(A) $-\frac{6}{\pi}$ ✓

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

(C) $\frac{2}{\pi}$

(D) 1

---

7. The derivative of the function f is given by $f'(x) = -3x + 4$ for all x, and $f(-1) = 6$. Which of the following is an equation of the line tangent to the graph of f at $x = -1$?

(A) $y = -3x + 3$

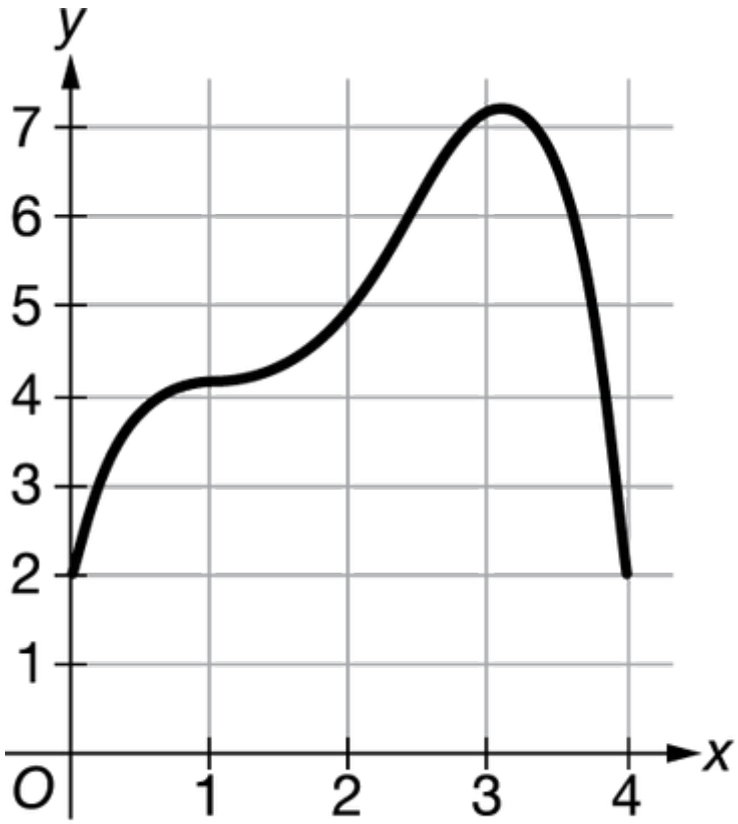
(B) $y = -3x + 4$

(C) $y = 7x + 6$

(D) $y = 7x + 13$ ✓

Unit 2 Progress Check: MCQ Part A

8.



Graph of f'

The graph of f', the derivative of a function f, is shown above. The points $(2, 6)$ and $(4, 18)$ are on the graph of f. Which of the following is an equation of the line tangent to the graph of f at $x = 2$?

(A) $y = 2x + 1$

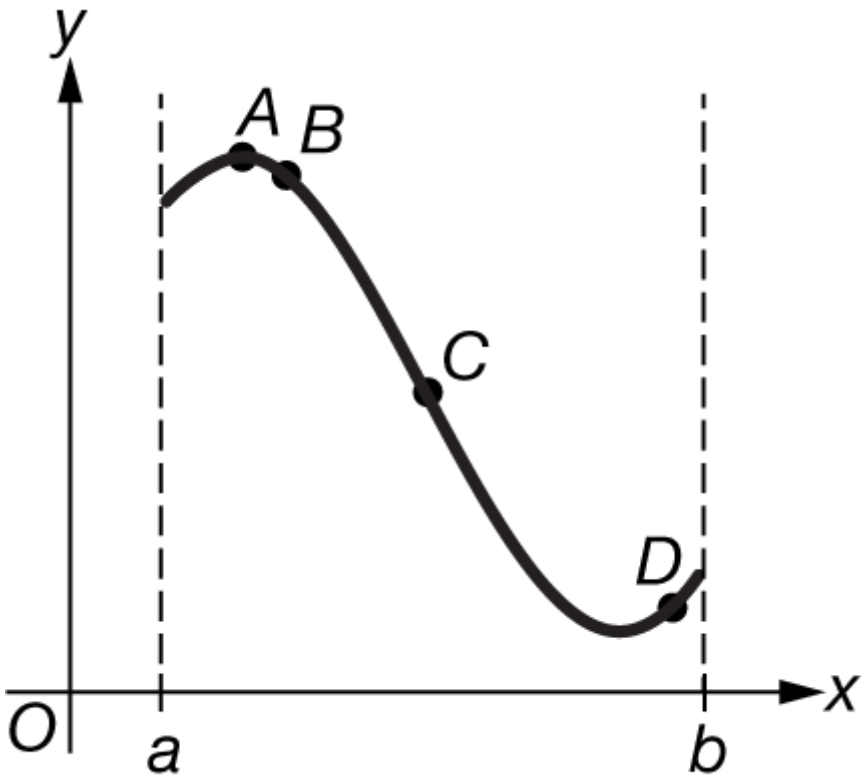
(B) $y = 5x - 4$ ✓

(C) $y = 5x - 10$

(D) $y = 6x - 6$

Unit 2 Progress Check: MCQ Part A

9.



Graph of f

The graph of the trigonometric function f is shown above for $a \leq x \leq b$. At which of the following points on the graph of f could the instantaneous rate of change of f equal the average rate of change of f on the interval $[a, b]$?

(A) A

(B) B ✔

(C) C

(D) D

Unit 2 Progress Check: MCQ Part A

10. Which of the following statements, if true, can be used to conclude that $f(2)$ exists?

1. $\lim_{x \to 2} f(x)$ exists.
2. f is continuous at $x = 2$.
3. f is differentiable at $x = 2$.

(A) I only

(B) II only

(C) II and III only ✓

(D) I, II, and III

---

11. $f(x) = \begin{cases} 3x + 1 & \text{for } x \leq 2 \\ 5x - 3 & \text{for } x > 2 \end{cases}$

Let f be the function defined above. Which of the following statements is true?

(A) f is neither continuous nor differentiable at $x = 2$.

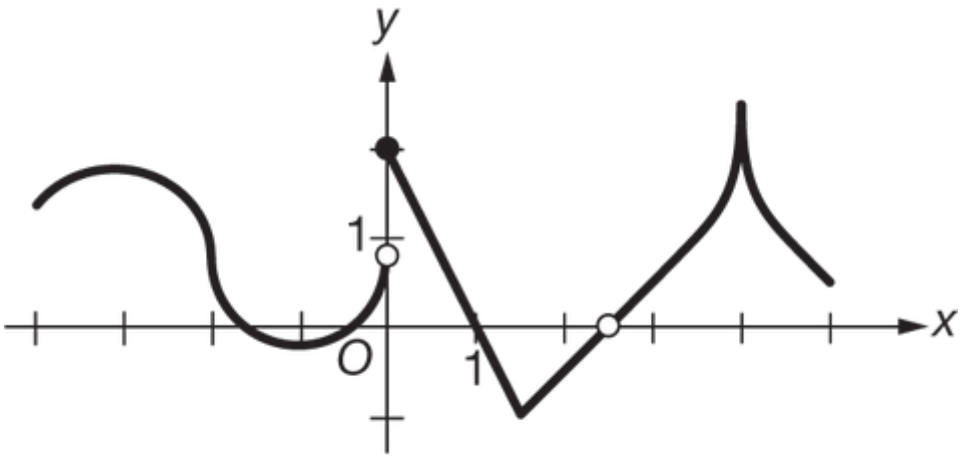
(B) f is continuous but not differentiable at $x = 2$. ✓

(C) f is differentiable but not continuous at $x = 2$.

(D) f is both continuous and differentiable at $x = 2$.

Unit 2 Progress Check: MCQ Part A

12.



Graph of f

The graph of the function f, shown above, has a vertical tangent at $x = -2$ and horizontal tangents at $x = -3$ and $x = -1$. Which of the following statements is false?

(A) f is not differentiable at $x = -2$ because the graph of f has a vertical tangent at $x = -2$.

(B) f is not differentiable at $x = 0$ and $x = 2.5$ because f is not continuous at $x = 0$ and $x = 2.5$.

(C) f is not differentiable at $x = 1.5$ and $x = 4$ because the graph of f has sharp corners at $x = 1.5$ and $x = 4$.

(D) f is not differentiable at $x = -3$ and $x = -1$ because the graph of f has horizontal tangents at $x = -3$ and $x = -1$. ✔

---

13. If $f(x) = x^5$, then $f'(x) =$

(A) x^4

(B) $4x^4$

(C) $5x^4$ ✔

(D) $5x^5$

Unit 2 Progress Check: MCQ Part A

14. If $f(x) = \frac{1}{x^7}$, then $f'(x) =$

(A) $\frac{1}{7x^6}$

(B) $-\frac{7}{x^6}$

(C) $-\frac{1}{7x^8}$

(D) $-\frac{7}{x^8}$ ✓

15. If f is the function defined by $f(x) = \sqrt[4]{x}$, what is $f'(x)$?

(A) $\frac{1}{4}x^{\frac{1}{4}}$

(B) $x^{-\frac{3}{4}}$

(C) $\frac{1}{4}x^{-\frac{3}{4}}$ ✓

(D) $4 \cdot \sqrt[3]{x}$