

AP[®] Exam Practice QuestionsSee LarsonCalculus.com for worked-out solutions to these questions.

What You Need to Know

- On some free-response questions, there may be more than one way of applying derivatives and theorems to justify your answer.
- Be prepared to apply the Mean Value Theorem. It may be referred to directly, or it may be necessary to use the theorem to justify your answer.
- Questions that involve position, velocity, and acceleration functions are very common on the AP[®] Exam.
- Be prepared to apply the Second Derivative Test to justify whether a point is a local maximum, a local minimum, or a point of inflection. For a point of inflection, make sure to also check for a sign change.
- The AP[®] Exam frequently uses limits at infinity as a way of describing horizontal asymptotes.
- Tangent line approximations, and whether such an approximation overestimates or underestimates a function value, are commonly tested on the free-response section.

Practice Questions

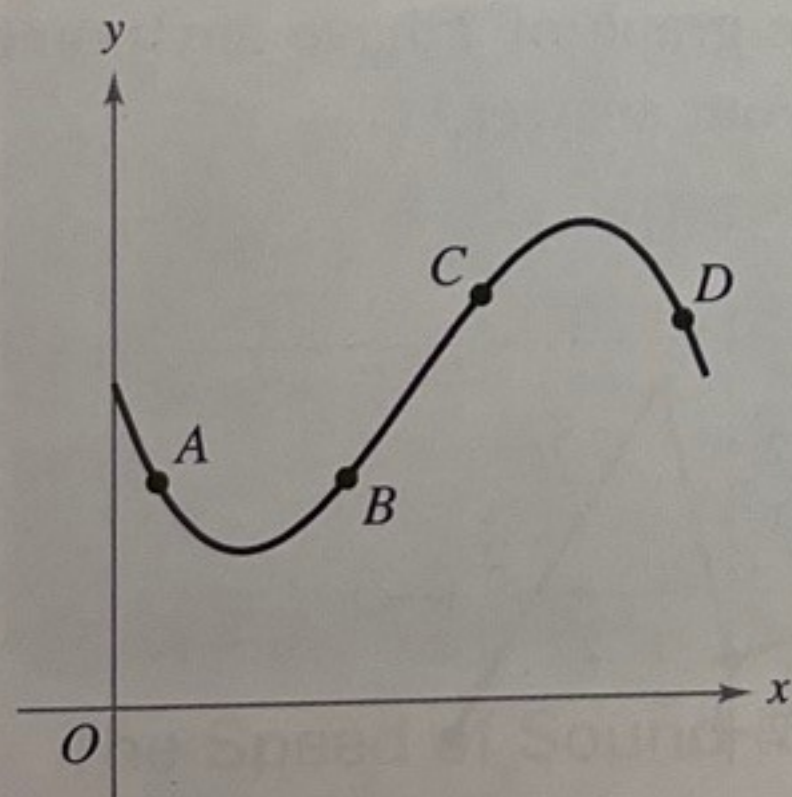
Section 1, Part A, Multiple Choice, No Technology

1. What are the critical numbers of

$$f(x) = 4x^3 + 6x^2 - 72x - 9?$$

- (A) $x = -2$ and $x = 3$ (B) $x = -3$ and $x = 2$
 (C) $x = -2$ (D) $x = -3$

2. At which of the four points on the graph shown is
- dy/dx
- positive and
- d^2y/dx^2
- negative?



- (A) A (B) B
 (C) C (D) D

3. The position of an object along a vertical line is given by
- $s(t) = -t^3 + 3t^2 + 9t + 5$
- , where
- s
- is measured in feet and
- t
- is measured in seconds. The maximum velocity of the object in the time interval
- $[0, 4]$
- is

- (A) 9 feet per second. (B) 12 feet per second.
 (C) 16 feet per second. (D) 32 feet per second.

4. What is the maximum area of a right triangle with hypotenuse 12?

- (A) 18 (B) 24
 (C) 36 (D) 48

5. The function
- g
- is continuous and differentiable on the interval
- $[2, 6]$
- . The table shows selected values of
- g
- on
- $[2, 6]$
- . Which of the following statements must be true?

| | | | | | |
|--------|---|---|---|---|---|
| x | 2 | 3 | 4 | 5 | 6 |
| $g(x)$ | 7 | 4 | 1 | 4 | 7 |

- (A) The minimum value of g on $[2, 6]$ is 1.
 (B) The maximum value of g on $[2, 6]$ is 7.
 (C) There exists a number c , with $2 < c < 6$, for which $g'(c) = 0$.
 (D) $g'(x) < 0$ for $2 < x < 4$
6. For $x \geq 0$, the horizontal line $y = 10$ is an asymptote of the graph of the function f . Which of the following statements must be true?
- (A) $f(10)$ is undefined. (B) $\lim_{x \rightarrow 10} f(x) = \infty$
 (C) $\lim_{x \rightarrow \infty} f(x) = 10$
 (D) $f(x) \neq 10$ for all $x \geq 0$

7. Let

$$f(x) = \begin{cases} \frac{x^2 + 4x - 32}{x^2 - 2x - 8}, & x \neq -2, 4 \\ 8, & x = 4 \end{cases}$$

Which of the following statements about f are true?

- I. f is not continuous at $x = 4$.
 II. $\lim_{x \rightarrow \infty} f(x) = 4$
 III. $x = 4$ is a vertical asymptote of the graph of $y = f(x)$.
- (A) I only (B) I and II only
 (C) I and III only (D) I, II, and III