AP® Exam Practice Questions

See LarsonCalculus.com for worked-out solutions to these questions.

What You Need to Know

- The derivative of the natural logarithmic function is frequently tested on the AP® Exam.
- The integrals in Theorem 5.5 are frequently tested on the AP® Exam.
- When showing your work on the AP® Exam, it is important to use proper notation in each of your steps. For example, when evaluating a limit using L'Hôpital's Rule, use the limit notation for each step, not just the first and last steps of your solution.

Practice Questions

Section 1, Part A, Multiple Choice, No Technology

1. What is an equation of the tangent line to the graph of $f(x) = 4e^x - x + 6$ at $(0, 10)$?

(A) $y = 4x + 10$ (B) $y = 4x - 10$

(C) $y = 10x - 4$ (D) $y = 3x + 10$

2. If $y = 6e^x - \frac{\pi \sin x}{4}$, $\frac{dy}{dx} =$

(A) $6xe^{x-1} - \frac{\pi}{4}\cos x$. (B) $6e^x - \cos x$.

(C) $6e^x + \frac{\pi}{4}\cos x$. (D) $6e^x - \frac{\pi}{4}\cos x$.

3. For $f(x) = 2x\sqrt{x-6}$, what is the value of $(f^{-1})'(40)$?

(A) $\frac{1}{9}$ (B) $\frac{1}{10}$

(C) $\frac{4}{5}$ (D) 10

4. What is the derivative of

$f(x) = \frac{1}{3}\arctan\frac{x}{3}$?

(A) $\frac{x}{9+x^2}$ (B) $\frac{3}{9+x^2}$

(C) $-\frac{1}{9+x^2}$ (D) $\frac{1}{9+x^2}$

5. If $f'(x) = \sec^2 x$ and $g'(x) = 4$ for all x, and if $f(0) = g(0) = 0$, then $\lim_{x\to 0}[f(x)/g(x)]$ is

(A) 0. (B) $\frac{1}{4}$.

(C) 4. (D) nonexistant.

6. $\int \frac{4}{(x-5)^2+9}\,dx =$

(A) $\frac{4}{3}\tan^{-1}\frac{x-5}{3} + C$ (B) $4\tan^{-1}\frac{x-5}{3} + C$

(C) $\tan^{-1}\frac{x-5}{3} + C$ (D) $\frac{1}{3}\tan^{-1}\frac{x-5}{3} + C$

7. Let f be a differentiable function such that $f(-2) = 3$, $f(3) = 5$, $f'(-2) = 4$, and $f'(3) = 6$. Let g be a differentiable function such that $g(x) = f^{-1}(x)$ for all x. What is the value of $g'(3)$?

(A) $\frac{1}{5}$ (B) $\frac{1}{4}$ (C) 4 (D) 6

8. $\frac{d}{dx}\left[\int_0^{x^2} e^{t^2}\,dt\right] =$

(A) 0 (B) $2e^{x^4}$ (C) $2xe^{x^4}$ (D) e^{x^4}

9. If $x \ln y = 2$, then $\frac{dy}{dx} =$

(A) $-\frac{y}{x} - \ln y$. (B) $-\frac{y \ln y}{x}$.

(C) $\frac{y \ln y}{x}$. (D) $-\frac{x \ln y}{y}$.

10. The graph of the function $h(x) = 4xe^{-x}$ is

(A) decreasing and concave upward on $(2, \infty)$.

(B) increasing and concave downward on $(-\infty, 2)$.

(C) increasing and concave upward on $(2, \infty)$.

(D) decreasing and concave upward on $(1, \infty)$.

11. $\lim_{x\to 1}\frac{5e^{1-x} - \ln x - 5}{x^2 - 1}$ is

(A) -3. (B) 4.

(C) 5. (D) nonexistent.

Section 1, Part B, Multiple Choice, Technology Permitted

12. If the Mean Value Theorem is applied to the function $f(x) = \ln(x-3)$ on the interval $[4, 8]$, then the number c that must exist in $(4, 8)$ is

(A) 5.485. (B) 5.885.

(C) 6. (D) 6.368.

13. Using the tangent line approximation of $f(x) = \cos^{-1} x$ at the point $(1/2, \pi/3)$, what is the value of $\cos^{-1}(0.52)$?

(A) 0.501 (B) 1.012

(C) 1.024 (D) 1.029