

18. $\int_e^{e^2} \frac{dx}{x \ln x} =$

- (A) $\ln 2$ (B) $\frac{1}{2}$ (C) 1 (D) 2 (E) e

19. Let $f(x)$ be a continuous and differentiable function on the interval $0 \leq x \leq 1$, and let $g(x) = f(3x)$. The table below gives values of $f'(x)$, the derivative of $f(x)$. What is the value of $g'(0.1)$?

x	0.1	0.2	0.3	0.4	0.5	0.6
$f'(x)$	1.01	1.041	1.096	1.179	1.298	1.486

- (A) 1.010 (B) 1.096 (C) 1.486 (D) 3.030 (E) 3.288
20. For what value of k will $\frac{8x+k}{x^2}$ have a relative maximum at $x = 4$?
- (A) -32 (B) -16 (C) 0 (D) 16 (E) 32
21. $\lim_{h \rightarrow 0} \frac{2(x+h)^5 - 5(x+h)^3 - 2x^5 + 5x^3}{h}$ is
- (A) 0 (B) $10x^3 - 15x$ (C) $10x^4 + 15x^2$ (D) $10x^4 - 15x^2$ (E) $-10x^4 + 15x^2$

22. If $\int_2^8 f(x) dx = -10$ and $\int_2^4 f(x) dx = 6$, then $\int_8^4 f(x) dx =$

- (A) -16 (B) -6 (C) -4 (D) 4 (E) 16

23. If the graph of $y = x^3 + ax^2 + bx - 8$ has a point of inflection at $(2, 0)$, what is the value of b ?

- (A) 0 (B) 4 (C) 8 (D) 12
(E) The value of b cannot be determined from the given information.

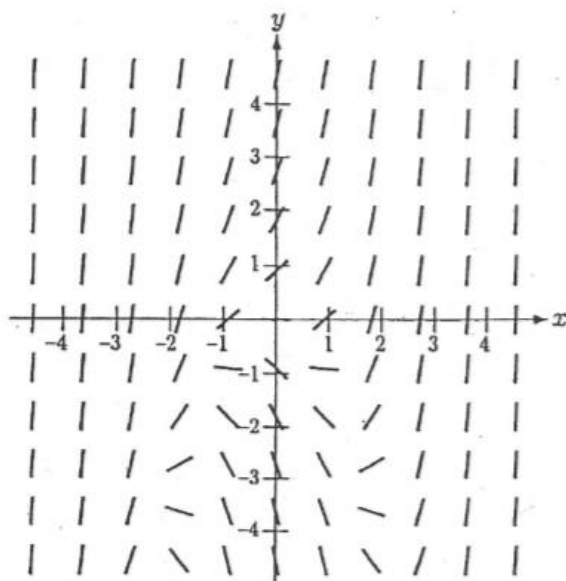
24. If $f(x) = x^{-\frac{1}{3}}$, what is the derivative of the inverse of $f(x)$?

- (A) $x^{\frac{1}{3}}$ (B) $-\frac{1}{3}x^{-\frac{4}{3}}$ (C) $\frac{1}{3}x^{-\frac{2}{3}}$ (D) $-3x^{-2}$ (E) $-3x^{-4}$

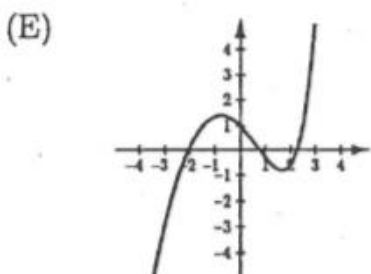
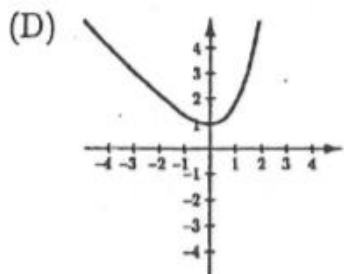
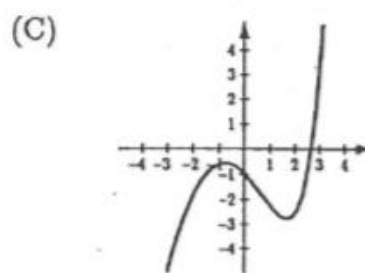
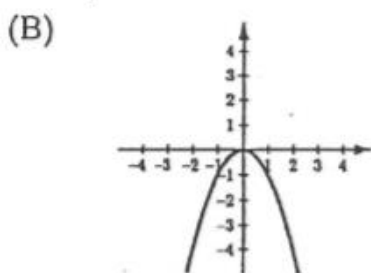
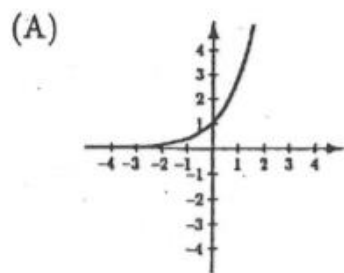
25. If f is a continuous function on the closed interval $[a, b]$, which of the following statements are NOT necessarily true?

- I. f has a minimum on $[a, b]$.
- II. f has a maximum on $[a, b]$.
- III. $f'(c) = 0$ for some number $c, a < c < b$.

- (A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III



26. Which of the following graphs could be a particular solution of the differential equation whose slope field is shown above?



27. The volume of a cube is increasing at the rate of 20 cubic centimeters per second. How fast, in square centimeters per second, is the surface area of the cube increasing at the instant when each edge of the cube is 10 centimeters long?

- (A) $\frac{4}{3}$ (B) 2 (C) 4 (D) 6 (E) 8

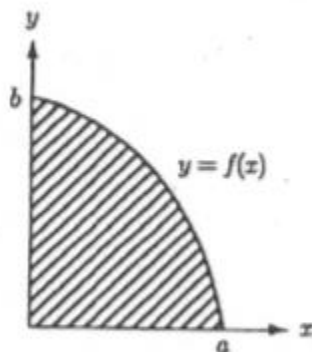
28. If $\frac{dy}{dx} = \frac{x}{y}$ and $y(3) = 4$, then

- (A) $x^2 - y^2 = -7$ (B) $x^2 + y^2 = 7^2$ (C) $x^2 - y^2 = 7$
 (D) $y^2 - x^2 = 5$ (E) $y^2 - x^2 = 7^2$

29. Let $f(x)$ be a continuous function and let A be the area of the shaded region in the figure

Which of the following must be true?

- I. $A = \int_0^a f(x) dx$
 II. $A = \int_0^b f^{-1}(x) dx$
 III. $A = \int_0^b f^{-1}(y) dy$



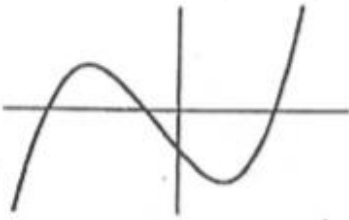
- (A) I only (B) II only (C) III only
 (D) I and II only (E) I, II, and III

30. The area of the region in the first quadrant enclosed by the y -axis and the graphs of $y = 3 \cos x$ and $y = x$ is

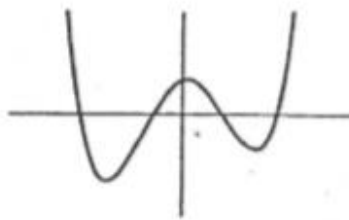
- (A) 1.170 (B) 1.571 (C) 2.078 (D) 3.142 (E) 3.447

31. If $f'(x) = (x - a)(x - b)(x - c)$ and $a < b < c$, then which of the following could be the graph of $f(x)$?

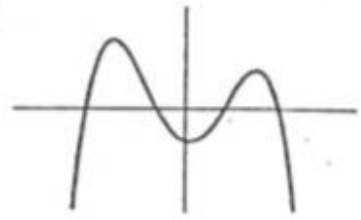
(A)



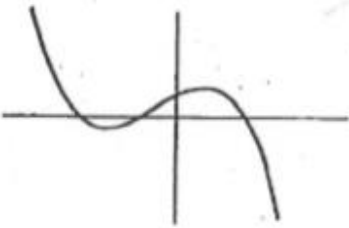
(B)



(C)



(D)



(E)

